QUALSTAR ®

RLS-8000
Tape Library

Installation and Operation
Manual

501500 Rev. W

Important Manual/Firmware Revision Information

This manual and the operating firmware for the RLS-8000 family of tape library systems are revised periodically as the product is improved. This manual was revised to correspond with the firmware version indicated below. Do not use this manual with prior versions of the firmware. Check with Qualstar Technical Support about use of this manual with older or newer firmware.

Manual	Corresponding Firmware
RLS-8000 Tape Library Installation and Operation Manual 501500 Rev. W, Revised 21 Mar 2011	RLS Executive Firmware 700118 Version 0.122

Copyright Notice

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Notices

Qualstar products are covered by one or more of the following patents: 6,163,139 and 6,560,061. Other patents pending.

Qualstar equipment is manufactured from new parts, or new and used parts. In some cases, Qualstar equipment may not be new and may have been previously installed. Regardless, Qualstar's warranty terms apply unless the equipment is specifically identified by Qualstar as "used" or "refurbished".

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Shielded cables are required for this device to comply with FCC Rules. Use shielded cables when connecting this device to others.

European Union Directive 89/336/EEC and Standard EN55022 (Electromagnetic Compatibility)

> **Warning**
> This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

European Directive on Waste Electrical and Electronic Equipment (WEEE)

Qualstar encourages its customers to use current recycling practices in order to reduce the burden that waste electronic products place on the environment.

If you are retiring a fully functional tape library, you are encouraged to transfer the functional unit to a new user, thereby extending the useful life of the tape library. The manufacture of all products requires the consumption of energy. By extending the life of the tape library, energy is conserved.

In accordance with environmental directives that are being implemented in many countries (refer to the European Directive on Waste Electrical and Electronic Equipment - WEEE) Qualstar provides customers with "End of Life Instructions" that

identify the process for recycling the materials and components that make up a Qualstar tape library.

End of Life Instructions

Tools required

- P1 and P2 Phillips head screwdrivers
- T20 Torx head screwdriver
- Hex head (Allen) wrench/driver set
- 1/4-inch hex nut driver

Disassembly procedure

1. Remove door.

2. Remove top panel.

3. Remove side external panels.

4. Remove internal subassemblies.

Items recyclable using conventional methods

- **Aluminum:** Door, exterior panels, frame, robotics
- **Stainless steel:** Robot guides
- **Steel:** Some frames, fasteners
- **Plastic:** Window, cartridge magazines, tape cassettes
- **Copper:** Internal wiring, motors, SCSI cables
- **Paper:** Manuals

Items requiring special disposal due to lead-based solder

- **Printed Circuit Boards:** Controller, miscellaneous small printed circuit boards

Items that may have salvage or resale value

- Tape drives
- EMI line power filter

Reduction of Hazardous Substances (RoHS)

Qualstar is committed to the implementation of RoHS (Restriction of the use of certain hazardous substances in electrical and electronic equipment) in accordance with the European Directive. The effectivity date for compliance is July 1, 2006, at which time Qualstar will certify that its Tape Library products are compliant with the RoHS standard. With the exception of Lead Based Solder, Qualstar will certify that its products are free of all other substances listed in the Directive.

Qualstar Tape Libraries fall under the category of "Information Technology Storage Array Systems" for which the RoHS Directive provides for a lead solder exemption until the year 2010. Insofar as lead free solders are new to the electronics industry and no quality or reliability data is available, Qualstar will invoke the lead based solder exemption until such time as industry data verifies that lead free solders are capable of meeting or exceeding the documented reliability and quality standards achieved with lead based solders.

Until such time as Qualstar replaces lead based solder with lead free solder, effected subassemblies must be disposed of appropriately.

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Table of Contents

1. Introduction

1.1   Who Should Read This Manual

This manual covers the entire family of RLS-8000 tape library systems. The common product reference is RLS. Where series or model differences require separate treatment exceptions are noted specifically. For clarity and compliance with the SCSI specification, the library control interface of the RLS is defined as a "Medium-changer" and alternately referred to throughout this manual as the "changer".

This Installation and Operation Manual is written for the RLS installer, the system administrator and the user/operator. This manual includes instructions on unpacking, installation, configuration and operation. Also included are preventive maintenance procedures and repacking instructions, in case it ever becomes necessary to transport the unit.

For information about the SCSI interface, or other information outside the scope of this manual, please refer to the appropriate documents listed below.

Subject	Document	Qualstar Document Number
Specifications	RLS-8000 Product Specification	501490
Service	RLS-8000 Technical Service Manual	501510
ADI Interface Quick Start	Product Application Note	PAN-025
Approved Data Cartridges	Product Information Note	PIN-038
Barcode Label Specifications	Product Information Note	PIN-040
Capacity on Demand	Ordering & Installing Capacity on Demand	PIN-044
SAS Cable and HBA Considerations	Product Information Note	PIN-046
SCSI Medium-changer Information	RLS SCSI-2 Interface Reference	501551
SCSI-2 Specification	ANSI X3.131-1994	N/A
SCSI SPI-3 Specification	NCITS T10 Project 1302D	N/A

Table 1-1   Applicable Documents

Although Qualstar has made every effort to insure the accuracy of the information contained in this manual, no guarantee is expressed nor implied that the manual is error-free. Qualstar reserves the right to make changes at any time without prior notification.

The Qualstar RLS is a sophisticated, state-of-the-art computer peripheral. It should only be serviced by an authorized service technician who is experienced with the

operation and maintenance of tape libraries, and only after reading and understanding this manual and the RLS-8000 Technical Service Manual.

1.2   Recommended Reading

- If you want to know it all, simply read this manual from cover to cover. Maybe you could skip the Repacking chapter.

- The Product Description chapter describes all of the capabilities and options possible with a Qualstar RLS library.

- Installers will certainly want to read the Specifications and Installation chapters.

- Tape recording media is sensitive to environmental operating and storage conditions. Section 5.4.4 covers media handling precautions in depth and should be considered required reading.

- Chapter 6 will introduce you to the operator interface while Chapter 7 deals with advanced configuration concepts including logical library function which is used to split the library storage resources among multiple host computers. The Variable I/O Port (VIOP) configuration is introduced as well.

- Chapter 8 deals with the myriad configuration details possible for optimizing the RLS for any imaginable application.

- Chapter 9 covers the Operations menu which includes manually moving tape cartridges.

- Chapter 10 covers Sequential Operation which facilitates usage with applications that do not directly support tape libraries. This operation mode is sometimes referred to as a "Stacker" or "Tape Stacker".

- Chapters 11 and 12 cover operation of the Q-Link and Fibre Channel Interfaces

- Chapter 14 covers what little preventative maintenance is required.

- This manual ends with Repacking instructions and a Glossary to define specialized terms that are used throughout the manual.

1.3   Important Safety Information

All of the operating instructions and maintenance procedures in Qualstar manuals must be followed to prevent personal injury or damage to the equipment. In the interests of safety, there are two kinds of warnings used in Qualstar documents, as shown below.

DANGER

PERSONAL INJURY MAY RESULT IF YOU DO NOT FULLY COMPLY WITH THE HANDLING, OPERATING, OR SERVICE INSTRUCTIONS FOUND IN A DANGER PARAGRAPH.

GEFAHR

**UNSACHGEMAESSE BENUTZUNG, BEDLENUNG ODER RAPARATUR
AUFGRUND VON NICHTBEACHTUNG DER SICHERHEITSANWEISUNG KANN
ZU VERIETZUNGEN FUEHREN.**

CAUTION

***EQUIPMENT DAMAGE OR LOSS OF DATA may result if you do not fully comply
with the handling, operating, or service instructions found in a CAUTION
paragraph.***

In addition, useful information and tips may be found throughout the document in the
following formats:

NOTE

*SPECIAL ATTENTION to explanatory statements found in a NOTE paragraph will help you avoid
mistakes and/or save time.*

NOTICE

A NOTICE box contains additional important information not covered by the
other three types of special text: DANGER, CAUTION, or NOTE.

1.4   Lithium Battery

Please observe the following when repairing the unit.

DANGER

U10, A DALLAS SEMICONDUCTOR CORPORATION DS1225AB OR A SGS-THOMPSON MICROELECTRONICS M48258X IC ON THE EXECUTIVE PCBA CONTAINS AN INTEGRAL LITHIUM BATTERY. AN EXPLOSION DANGER EXISTS IF THE IC IS INCORRECTLY REPLACED. REPLACE THE IC ONLY WITH THE SAME PART NUMBER, OR AN EQUIVALENT DESIGNATED BY THE MANUFACTURER. DISPOSE OF THE USED IC ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

GEFAHR

DER U10, EIN DALLAS SEMICONDUCTOR CORPORATION DS1225AB ODER EIN A SGS-THOMPSON MICROELECTRONICS M48258X IC AUF DEM EXECUTIVE BOARD ENTHAELT EINE INTEGRIERTE LITHIUM BATTERIE. WENN DIESE UNSACHGEMAESS AUSGETAUSCHT WIRD, BESTEHT EXPLOSIONS GEFAHR. DER IC DARF NUR DURCH EINEN ARTIKEL MIT DER SELBEN ARTIKELNUMMER, BZW, MIT EINEM VERGLEICHBAREN ARTIKEL LAUT HERSTELLER ANGABE ERSETZT WERDEN. DIE ENTSORGUNG DES ALTEN IC'S DARF NUR GEMAESS HERSTELLERANGABEN ERFOLGEN.

2.   Product Description

2.1   General Description

The RLS Series is a family of automated rack-mountable tape libraries. All RLS-8000 Models are 5 rack-units tall (5U = 8.75-inches). There are presently 15 models that utilize LTO tape technology.

Models are available with native storage capacities of over 65-terabytes. The library is under host control via an Ultra-160 compatible SCSI interface. A Fibre Channel interface is offered as an option.

Each library contains a high performance robotics system for handling data cartridges, one to four tape drive bays and removable magazines for data cartridges. All units operate on internationally available AC power with active power factor correction.

The RLS Series is designed for maximum reliability. Only the highest quality components are used in a design that is inherently robust and simple. Brushless motors are used exclusively to effect smooth and reliable operations. All digital, closed-loop servo systems using magnetic and optical position sensors assure fast, smooth, trouble-free cartridge handling. The servos automatically calibrate themselves, thus eliminating all electrical adjustments. Preventive maintenance is reduced to replacing the air filter, when so prompted by the control panel display.

2.2   Standard Features Found in All Models

- Plug-in Interface Personality Module (IPM) provides LVD/SE SCSI Interface or ADI, surrogate SCSI interface

- Barcode scanning of data cartridge labels

- Q-Link web-based library manager can remotely control the RLS and automatically e-mail alarm messages to a contact list (operating firmware may be remotely updated)

- Simultaneous Random and Multi-Sequential operating modes with two tape drives

- Logical Libraries feature supports simultaneous connections to as many as four hosts (ADI only)

- The key-lockable front panel has two windows for good visibility into the lighted interior

- Control panel utilizes six pushbuttons and a white backlit 80-character display

- Easy-to-use menu system for configuration, operation and maintenance

- VIOP (Variable I/O Port) allows users to set the number of storage slots, including entire magazines, dedicated to inserting/removing tape cartridges. Not available on RLS-8216C, 8216CD, 8236C or 8236CD models.

- Tape drives are in quick-change carriers that plug in/out from the front

- Automated tape drive cleaning

- Operating firmware may be updated via the SCSI interface or Q-Link

- Mean-Exchanges-Between-Failures (MEBF) exceeds 2,000,000 exchanges

- Maintenance-friendly by design: no adjustments, quick-swap drives, plug-in power supply modules

- Filtered, forced-air cooling of library and tape drives provided by redundant fans and front replaceable air filter

- Universal input power rating (100- to 240-VAC, 50/60 Hz)

- Power Factor Corrected (PFC) power supply is very efficient and fully CE compliant

2.3   Optional Features Available

- Plug-in 2Gb/second Fibre Channel Interface Personality Module (IPM) (operating firmware may be updated via this interface). Not available on RLS-8236D or 8244D models.

- Hot-Swappable Drive Interface Adapters (HS-DIA) facilitate hot-swapping tape drives without resetting SCSI busses.

- Dual-redundant, hot-swappable Power supply modules with independent power cords. (with the Q-Link, automatic e-mail alarm message sent when any power supply or fan fails)

- Rack mount slide kit

2.4   Models
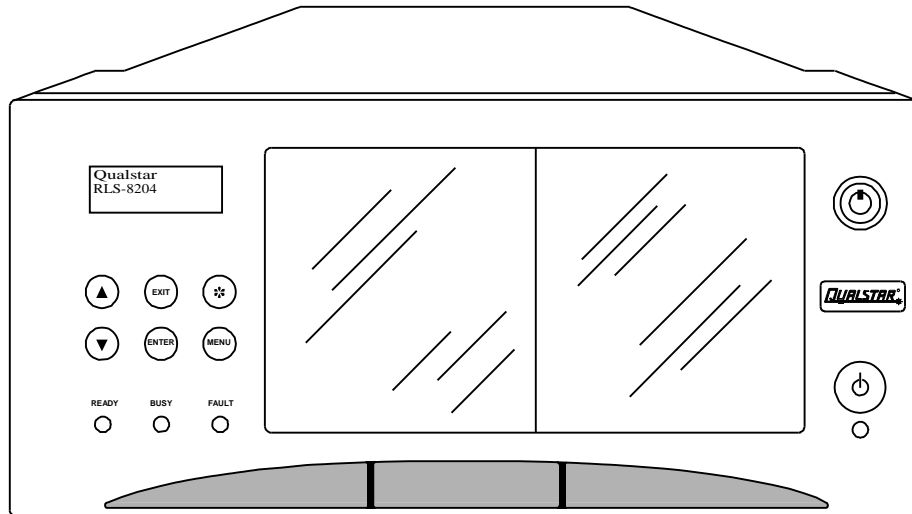
FEATURE/MODEL	RLS-8202 {	RLS-8204 {	RLS-8204D { ∣	RLS-8236	RLS-8236D ∣
Tape Technology	LTO	LTO	LTO	LTO	LTO
Maximum No. of Drives	2	2	2	2	2
Total Cartridge Capacity	12-36	12-44	12-44	36	36
Number of Magazines	3-9	3-11	3-11	9	9
Cartridges per Magazine	4	4	4	4	4
Barcode Reader	Standard	Standard	Standard	Standard	Standard
Q-Link Remote Manager	Standard	Standard	Standard	Standard	Standard
Quick swap tape drive carriers	Standard	Standard	Standard	Standard	Standard
Standard Power Module Output (watts)	160	160	160	160	160
Redundant, Hot-Swappable Power Modules (Dual 250-watt modules)	Optional	Optional	Optional	Optional	Optional

{ Features field-upgradeable Capacity on Demand

∣ "D" models support LTO DFA fibre channel tape drives

Table 2-1   RLS-8000 Models, Features and Options (continued below)

FEATURE/MODEL	RLS-8216C	RLS-8216CD[l]	RLS-8236C	RLS-8236CD[l]
Tape Technology	LTO	LTO	LTO	LTO
Maximum No. of Drives	2	2	2	2
Total Cartridge Capacity	16	16	36	36
Number of Magazines	4	4	9	9
Cartridges per Magazine	4	4	4	4
Barcode Reader	Standard	Standard	Standard	Standard
Q-Link Remote Manager	Standard	Standard	Standard	Standard
Quick swap tape drive carriers	Standard	Standard	Standard	Standard
Standard Power Module Output (watts)	160	160	160	160

[l] "D" models support LTO DFA fibre channel tape drives

Table 2-2 RLS-8000 Models, Features and Options (continued below)

FEATURE/MODEL	RLS-8244	RLS-8244D[l]	RLS-8444	RLS-8444D[l]	RLS-8404[{]	RLS-8404D[{][l]
Tape Technology	LTO	LTO	LTO	LTO	LTO	LTO
Maximum No. of Drives	2	2	4	4	4	4
Total Cartridge Capacity	44	44	44	44	12-44	12-44
Number of Magazines	11	11	11	11	11	11
Cartridges per Magazine	4	4	4	4	4	4
Barcode Reader	Standard	Standard	Standard	Standard	Standard	Standard
Q-Link Remote Manager	Standard	Standard	Standard	Standard	Standard	Standard
Quick swap tape drive carriers	Standard	Standard	Standard	Standard	Standard	Standard
Standard Power Module Output (watts)	160	160	250	250	250	250
Redundant, Hot-Swappable Power Modules (Dual 250-watt modules)	Optional	Optional	Optional	Optional	Optional	Optional

[{] Features field-upgradeable Capacity on Demand
[l] "D" models support LTO DFA fibre channel tape drives

Table 2-3 RLS-8000 Models, Features and Options

2.5   Model Identification

Series Identifier
Maximum Number of Drives
Maximum Number of Cartridges in Magazines

RLS-0000
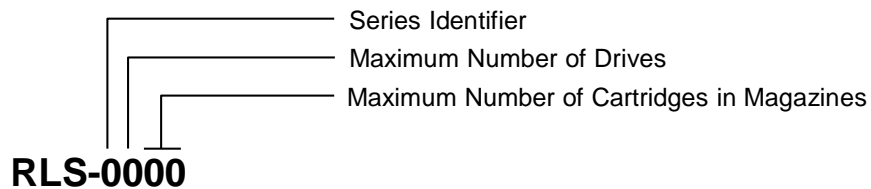
Figure 2-1   Model Number Identification Scheme

This manual applies to all models. The installation and operation of the various models is virtually identical. Differences among the models are noted where required.

2.6 Major Features

2.6.1 Capacity on Demand (COD)

The Capacity on Demand (COD) feature allows the storage capacity of RLS-8202, 8204, 8204D, 8404 and 8404D models to be field expanded from 12 tape cartridges up to 36 or 44 (model dependent) in increments of eight. To order an upgrade kit contact an authorized Reseller, or Qualstar Sales at 805-583-7744 x 773. Necessary information about ordering and installing COD can be found in PIN-044 available at www.qualstar.com (click on the Support tab).

2.6.2 Cabinet

The cabinet is all aluminum with a hinged top cover to provide easy access for upgrades and field service. The Interface Personality Module (IPM) plugs into the rear as does a single or two redundant power supply modules. All power and data connections are in the rear.

2.6.3 Front Panel Components

A key-operated lock secures the front panel/door thus preventing unauthorized access to media or drives. Other components include the control panel, VIOP door, main power switch and power LED. When the front panel/door is opened, an interlock switch senses the open condition and halts further robotic movement until the door is closed.

When unlocked and released by the system, the entire front panel/door hinges open for accessing media and exchanging or installing tape drives. The VIOP door can be opened by the robotics when the front panel/door is closed or locked.

2.6.3.1 Control Panel

The left side of the front panel contains the control panel and status indicators. The control panel has a four-line, 80-character, backlit display, six push button control keys, three color-coded status LEDs (READY = GREEN, BUSY = YELLOW and FAULT = RED) as well as an audible alarm. The operator uses the control keys and display to configure and operate the RLS. The panel also provides operational status. The following information can be displayed:

- Model number and the firmware revisions of all internal microprocessors
- Extensive menu system for configuration, maintenance and operation
- Operational status (indicates all active cartridge movements)
- History log which stores the most recent commands and status
- Error conditions

• Configuration status of the optional Fibre Channel and Q-Link interfaces
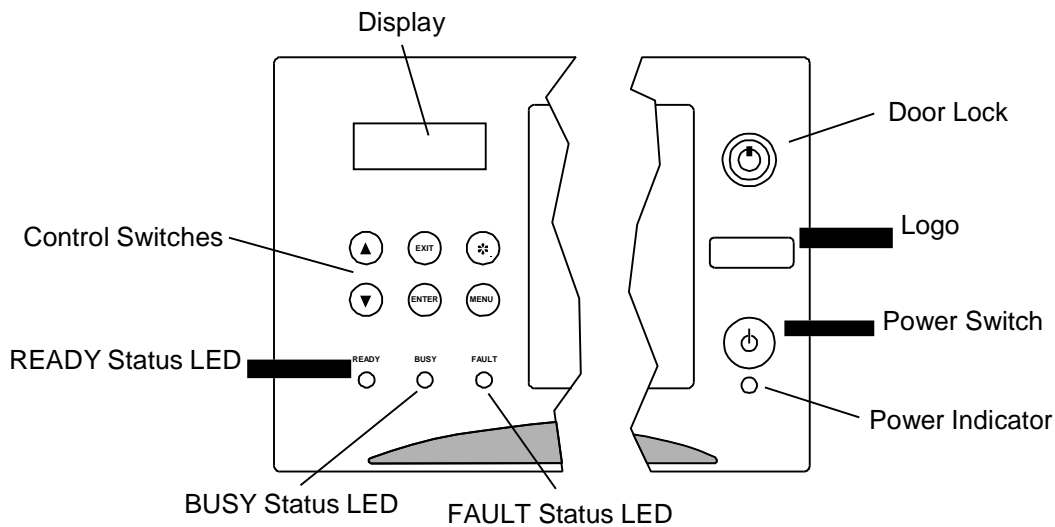
Figure 2-2   RLS Front Panel Details

The six pushbutton control switches are used to manually control the RLS by means of the menu system and are identified in Table 2-4.

NAME	FUNCTION
V	Scrolls up through menu items.
W	Scrolls down through menu items.
ENTER	Accepts the currently displayed menu choice.
EXIT	Exits the present menu and returns to the previous menu level.
~	Displays the Quick Operation menu
MENU	Opens the menu system. When already inside the menu system, this key always returns you to the Top Menu. When at the Top Menu this key exits the menu system.

Table 2-4   Control Panel Switches

2.6.3.2   Door Lock

When the key-operated Door Lock is locked, the front panel/door cannot be opened under any circumstances, however the VIOP door can still be operated. Even when unlocked by the key, the front panel/door cannot be opened if a host computer has commanded the RLS to prevent media removal. When unlocked by the key and allowed by the host, the front panel/door can be opened via a menu command. In emergency situations, a paper clip can be used to override the host lock provided the key lock is in an unlocked state.

2.6.3.3 Power Switch and Indicator

A push-on/push-off button controls primary power to AC powered units. D.C. powered units must be switched on or off from the rear panel. A green front panel power indicator illuminates when primary power is on.

2.6.3.4 VIOP

The Variable Input/Output Port (VIOP) performs the SCSI Import/Export function and is standard on every RLS, except for the RLS-8216C, 8216CD, 8236C and 8236CD models. As its name implies, VIOP provides a user-configured variable sized Import/Export port. The operator gains access to the VIOP through a smaller door called the VIOP door. Once opened, tape cartridges and/or entire magazines may be removed or inserted. The VIOP door is opened by the RLS robotics either through a control panel request or under host control but must be manually closed by the operator. The RLS cannot execute host commands involving media movement while the VIOP door is open. The RLS may be configured to respond as *busy* or *not ready* while waiting for the operator to close the VIOP door.

2.6.4   Rear Panel Components
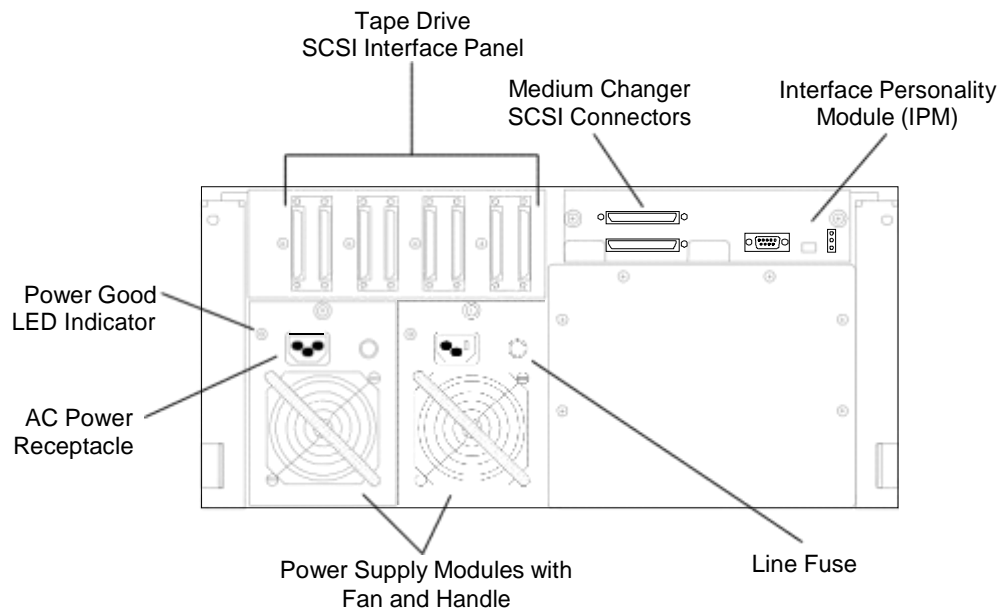
Figure 2-3   RLS Rear Panel Details (4-SCSI Drives & Dual-Redundant, Power Supply Modules shown)
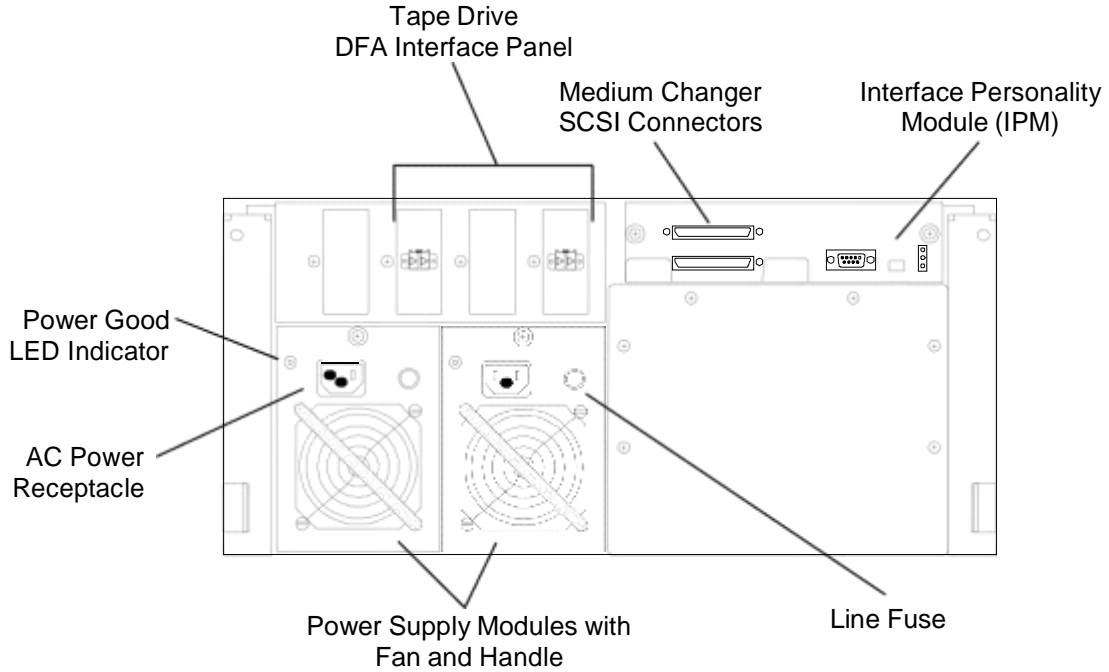
Figure 2-4   RLS Rear Panel Details (RLS-8236D/8244D shown)
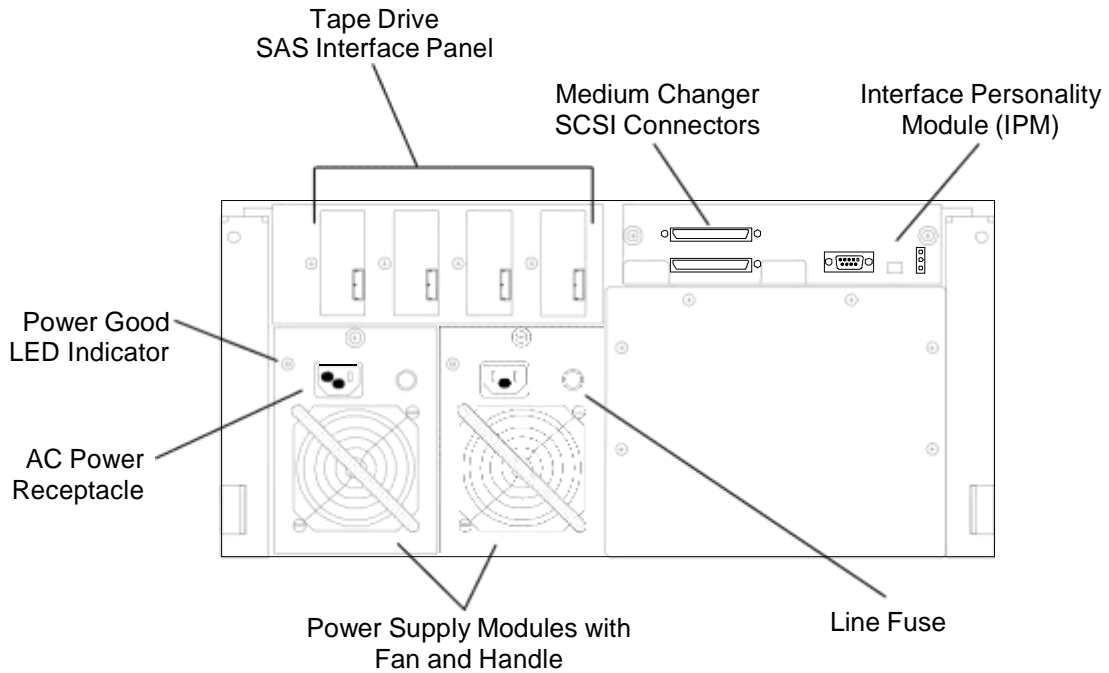
Figure 2-5   RLS Rear Panel Details (RLS-8404 with SAS tape drive connectors shown)

2.6.4.1 Power Supply Modules (PSMs)

There are three power supply configurations available.

1. A 160-watt PSM powers the RLS-8216C, 8216CD, 8236C and 8236CD models

2. A 250-watt full-sized PSM is standard on all other models

3. Two, 250-watt, half-sized PSMs running in a redundant, hot swappable configuration are optional on all models that utilize a full size 250-watt PSM

All PSMs supply regulated 24-volts DC to the RLS. The first configuration is powered from AC mains of 100- to 240-volts, 50 or 60 Hertz. Each PSM also contains a power receptacle (safety disconnect), line fuse and power cord receptacle.

In the third configuration, two PSMs operate in parallel and equally share the load. This reduces the stress on the power supplies and greatly extends their MTBF (Mean Time Between Failure). The two PSMs are identical and either one is capable or running the RLS on its own. Should a PSM fail, the other one will run the RLS indefinitely. The RLS and tape drives will continue to function, uninterrupted by the failure and subsequent replacement of the failed PSM. A green POWER GOOD LED indicates that a half-sized PSM is operating properly. Each PSM has its own power cord and it is recommended that these be connected to different AC power sources (ex. Two UPS') to enhance overall system availability. A failed PSM or power source causes an alarm condition that can result in e-mail notification by the Q-Link remote library manager.

Each half-sized PSM contains a fan and full-sized 250-watt PSMs have two fans. A failed fan causes an alarm condition that can result in e-mail notification with the Q-Link remote library manager. With dual PSMs, both fans continue to run even when a PSM fails.

2.6.4.2 Interface Personality Modules (IPMs)

The IPM is a plug-in module that can be changed when the RLS is powered-down. It always contains the SCSI connectors to the RLS medium changer and an RS-232 serial port that can be used for remote management.

There are three IPMs available:

- LVD/SE (Multi-mode) SCSI IPM medium changer interface is used with libraries equipped with LTO LVD tape drives.

- Fibre Channel to SCSI Bridge (FCO) IPM connects the medium changer to a single, 2Gb/second Fibre Channel port. This IPM is used with libraries equipped with LTO 3 FC and LTO 4 FC tape drives.

- ADI Surrogate SCSI IPM is used with LTO 5 SAS, LTO 5 FC and some LTO 4 FC tape drives. The ADI IPM does not provide a separate connection to the medium changer. Medium changer control is transferred via the interface to Drive 1, or via the first drive in a partition. Please refer to PAN-025 at www.qualstar.com (click on Support tab) for more information.

The Q-Link Remote library manager is supported on all IPM models. Q-Link provides a 10BaseT half-duplex connection to LANs and the Internet.

See Section 2.8 for more details about Q-Link and section 2.9 for more details about Fibre Channel.

2.6.4.3   Tape Drive SCSI Interface Panel

There is a pair of HD-68 SCSI connectors provided on the Interface Panel for each SCSI tape drive, even if a drive is not installed. The standard SCSI interface is a loop, capable of running at FAST-160 speeds, from one of these connectors to the tape drive's SCSI connector and back to the other connector. This scheme provides for quick drive changes without unplugging the SCSI cables attached to the interface panel. However, when a tape drive is removed, the connection between the pair of SCSI connectors on the interface panel is broken. Thus, unplugging a tape drive on a live system may cause the SCSI bus to hang.

The Buffered Drive Interface Adapter (BDIA) option places active circuitry between the interface panel connectors and each tape drive. Thus, when a drive is unplugged, the connection between the SCSI connectors and the SCSI termination power remain intact, preventing bus hangs or resets.

2.6.4.4   Tape Drive DFA (Direct Fibre Attach) Interface Panel

On the RLS-8204D, 8236D, 8244D, 8404D and 8444D models there is a fibre channel connector provided on the Interface Panel for each DFA tape drive. See Figure 2-4.

2.6.4.5   Tape Drive SAS (Serial Attached SCSI) Interface Panel

When SAS tape drives are ordered on the RLS-8236, 8204, 8244, 8404 or 8444 models there is a SAS connector provided on the Interface Panel for each SAS tape drive. See Figure 2-5.

2.6.5   RLS Medium-changer Components
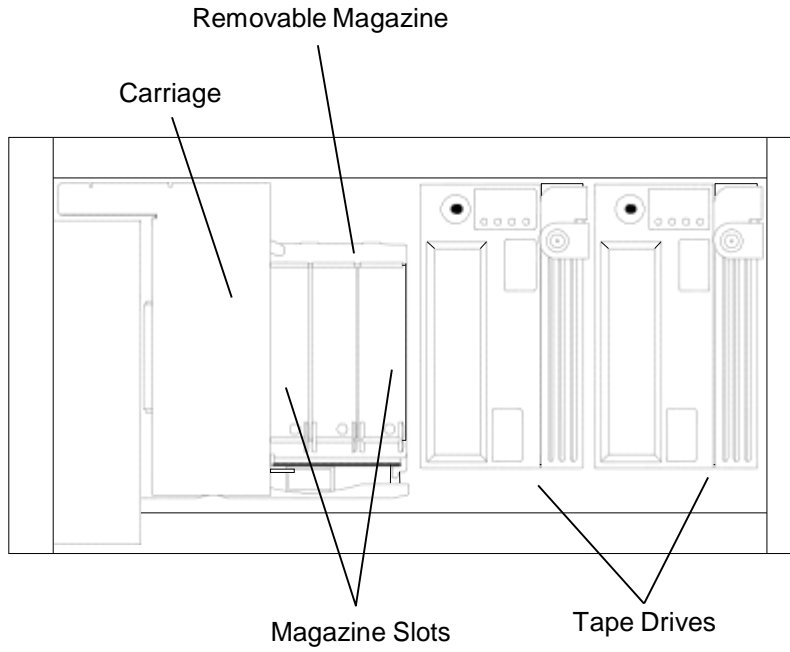
Figure 2-6   Front View of Medium-changer Components (Door open, RLS-8202 shown)
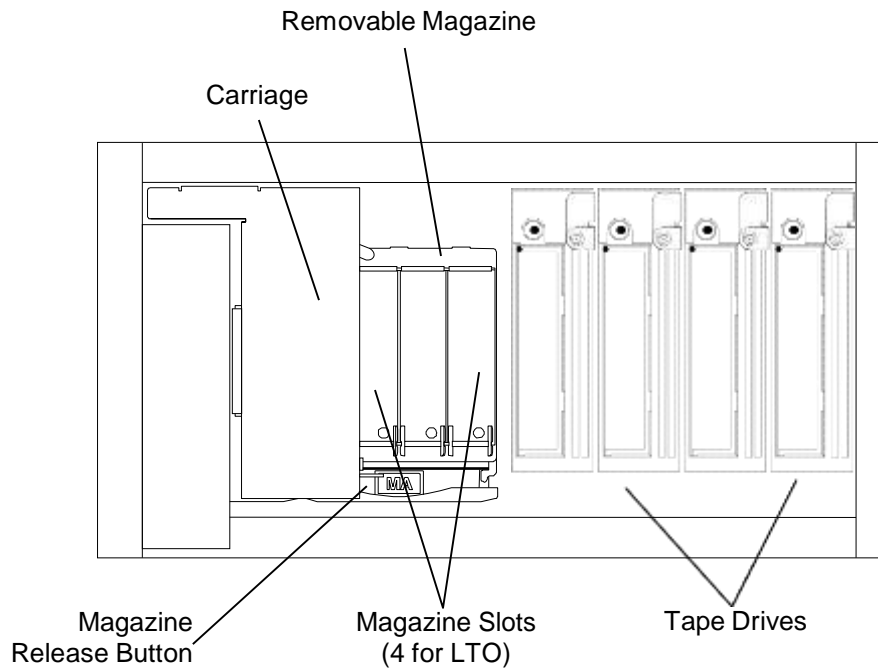
Figure 2-7   Front View of Medium-changer Components (Door open, RLS-8444 shown)

2.6.5.1 Magazines

A magazine is a multi-slot container that, depending on the tape technology selected, can hold from three to five tape cartridges. Magazines for different cartridge types may not be mixed within the same RLS unit. An entire magazine with cartridges can be removed from the RLS as a unit and stored with a dust cover. Magazines are pushed onto their mounts where they snap into their locked position. They are easily removed by pressing the latch release button. Additionally, each cartridge is individually locked within the magazine to prevent mishandling or damage.

2.6.5.2 Storage Array

The RLS-8202, 8216C, 8216CD, 8236, 8236C, 8236CD and 8236D models utilize a patented storage array that holds up to 9 magazines in a rectangular array that is 2 magazines wide and 5 magazines deep. One of the possible 10 magazines is missing in order to facilitate movement of the other 9. With its increased depth, the RLS-8204, 8204D, 8244, 8244D, 8404, 8404D, 8444 and 8444D models hold two more magazines (11 magazines out of 12 positions). The magazines are identified MA through MI or MK and the magazine in the right front corner is accessible by the Handler.

The magazines in the storage arrays are shuffled around the racetrack-like array in either direction. The direction of movement is chosen to minimize the time to access the desired magazine.

All storage arrays employ the same high-reliability mechanism that utilizes a single brushless DC motor and resides in less than 1.5-inches of space beneath the array. If no power is available, a blade screwdriver can be inserted through a hole in the bottom of the RLS to manually move the storage array in either direction.
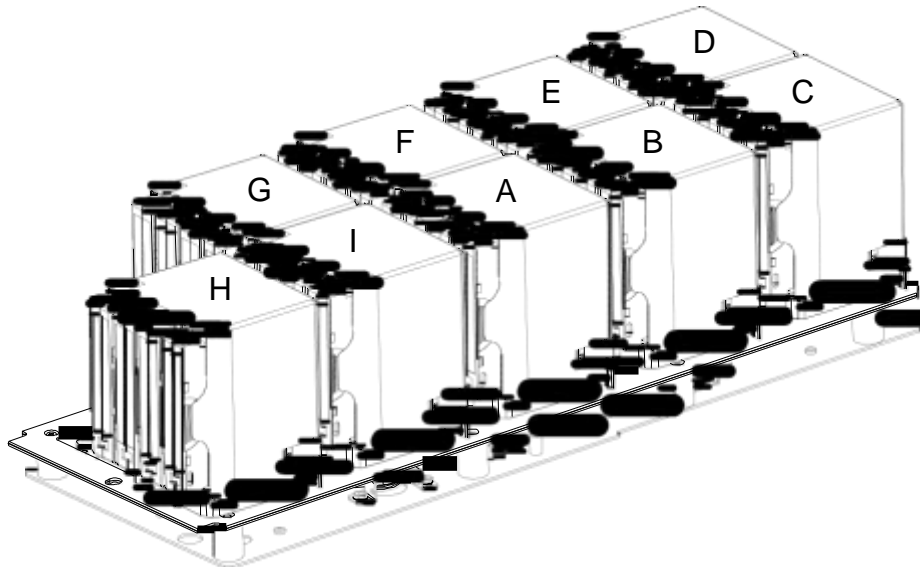
Figure 2-8   Storage Array Layout (Model 8236 Shown, Letters Identify Magazines)

2.6.5.3 Inventory Sentry

The Inventory Sentry projects an infrared beam in front of all accessible cartridge locations and tape drives. If the front panel/door is opened but the inventory is not disturbed, then closing the front panel/door immediately returns the RLS to operational status without having to rescan the cartridge inventory.

However, if Inventory Sentry beam is broken when the front door panel is open; the RLS inventory status is invalidated. When the front panel/door is closed, the RLS will automatically rescan the cartridge inventory (and barcode labels if present) and update its internal inventory database before becoming ready.

2.6.5.4 Variable VIOP

All libraries except the RLS-8216C, 8216CD, 8236C and 8236CD models support the Variable I/O Port (VIOP) feature that allows users to set the number of storage slots dedicated to import/export function. The slots are assigned in one-slot increments from zero up to all available slots in a single magazine. If the selected number of VIOP slots equals the number in a magazine, then the entire magazine may be removed as an I/O unit. The VIOP door can be opened by the host computer or via the operator control panel. The operator must always close the VIOP door.

2.6.5.5 Robotics

The RLS utilizes a two-axis robotic cartridge handling mechanism that moves cartridges between the storage slots and the tape drives. In the unlikely event this assembly ever needs replacing, it can be accomplished in less than 5-minutes.

All motion is powered by brushless DC motors turning precision leadscews and drive shafts. Magnetic sensors provide position and velocity feedback to the motors, while optical sensors provide absolute positional information. This unique design produces optimum positioning accuracy, reliability and long life. The servo systems are digital, self-calibrating and never require mechanical adjustments.

2.6.5.6 Tape Drives

Depending upon the model, each RLS accommodates either 2 or 4 tape drives. Each tape drive is packaged in a quick-swappable drive carrier. An embedded microprocessor in each drive carrier communicates with the tape drive via its supervisory port to ascertain its model, serial number and operational status. This information is immediately uploaded to the RLS executive processor and is available to the host computer whenever a new drive is plugged-in. The drive's SCSI ID is set to the RLS menu values only when drive power is applied.

Drive carriers contain voltage regulators that power the tape drive. These regulators are automatically shutdown whenever a drive is unplugged. Any tape drive may be exchanged without disrupting the others by opening the front panel/door. A drive can be exchanged within one minute without tools. The drive carrier can also provide SCSI termination power when enabled through the RLS Configuration menu.

Tape drive firmware can be uploaded by either the SCSI bus or a code-load tape. The status LEDs of all drives are easily visible through the RLS front panel window.

2.6.5.7 Cooling System

Two rear mounted axial fans draw outside air into the cabinet through a front-mounted replaceable air filter. The air is exhausted out the rear of the unit. Temperature sensors monitor internal temperatures and sound an audible alarm and display an alarm message when the RLS operating temperature limits are exceeded. A temperature alarm message can also be sent to a list of e-mail recipients via the Q-Link remote library manager. The RLS also periodically prompts the user to replace the air filter. This message can also be e-mailed via Q-Link.

2.6.5.8 Barcode Reader

An integrated barcode reader (BCR) is included on all RLS models. The BCR can uniquely identify each barcode labeled cartridge, thus saving the system from reading each cartridge in a tape drive. Preprinted barcode labels, which are both human- and machine-readable, are available from a number of sources including Qualstar.

The barcode reader consists of an LED light source and a Charge-Coupled Device (CCD) sensor (similar to that used in a video camera) and associated electronics. It is mounted on the carriage and contains no moving parts. The barcode reader can scan all cartridges within the RLS (except those loaded inside tape drives). Barcode data is stored internally in the changer's non-volatile RAM (the internal inventory database) and is available to the host computer upon request.

2.6.6 Barcode Labels

Pre-printed barcode labels, which are both human- and machine-readable, are available from a number of sources including Qualstar.

Barcode labels must conform to ANSI/AIM BCI-1995, Uniform Symbology Specification Code 39. Please refer to PIN-040 at www.qualstar.com (click on Support tab) for more information.

By default, the RLS expects a modulus 43 check character at the end of each label. The use of a check character helps assure that labels are read error-free. The RLS configuration must be changed before using barcode labels without a check character. All of the labels within the RLS must match the check character configuration: either all with or all without a check character.

2.7   The SCSI Interface

For the sake of clarity and compliance with the SCSI specifications, the functional portion of the RLS is defined as a "Medium-changer". The standard SCSI control interface to the Medium-changer is both Low-Voltage Differential (LVD) and Single-Ended (SE) capable. This is defined by ANSI as Multi-Mode Low Voltage Differential or MLVD and is also called LVD/SE. All of the supported tape drives have MLVD interfaces. When LVD and SE devices are mixed on the same SCSI bus, the bus will only operate in the single-ended mode. Wide (16-bit) and narrow (8-bit) devices may always be combined on the same bus.

There is a pair of 68-conductor SCSI connectors on the rear of the RLS for the Medium-changer and for each possible tape drive.

The user can change the SCSI ID of the Medium-changer and all the SCSI tape drives from the control panel or via Q-Link as described in this manual. The complete SCSI-2 interface protocol is described in Qualstar's SCSI Interface Manual, Document No. 501551.

The standard Passive Drive Interface Adapter (Passive DIA) provides a direct loop-through connection between a SCSI tape drive and the pair of SCSI connectors on the rear panel. A SCSI tape drive may be removed from or inserted into the RLS while it is powered (hot) and while other tape drives are operating, however, the connection between the pair of SCSI connectors for the removed drive will be broken. SCSI termination power from the tape drive carrier will also be lost while the drive is removed. Thus, carelessly unplugging a tape drive on a live system will generally cause the SCSI bus to hang and bring down the system. This scheme is referred to as Quick-Swappable and is capable of running at FAST-160 SCSI speeds.

The optional Buffered Drive Interface Adapter (BDIA) introduces a FAST-160 SCSI expander (repeater) chip between the tape drive and the pair of SCSI connectors on the rear panel. A tape drive may be removed from or inserted into the RLS while it is powered (hot) and while other tape drives are operating. The connection between the pair of SCSI connectors for this drive will NOT be broken when the drive is removed and all other SCSI devices on this drive's SCSI bus will continue to function while the drive is removed from the RLS. If enabled, SCSI termination power for this pair of connectors also remains active while the tape drive is removed. Most systems should continue to operate without disruption with the removal of a tape drive with this option. This scheme is referred to as Hot-Swappable.

The user can configure the SCSI ID of the Medium-changer and all contained SCSI tape drives from the RLS control panel or via the Q-Link remote manager. The complete RLS Medium-changer SCSI-2 interface protocol is described in Qualstar's SCSI Interface Reference, Document No. 501551.

2.7.1   SCSI Connector

The standard RLS SCSI interface utilizes dual-stacked HD68 (SPI-2) connectors (AMP P/N 787679-1 or equivalent). The mating connector is an AMP 750752-1 or equivalent. Jackscrew locking hardware is utilized.

The optional 2-Gb Fibre Channel bridge Interface Personality Module utilizes dual-stacked Very High Density Cable Interconnect (VHDCI) connectors (AMP 1364306-1 or equivalent). The mating connector is an AMP 787775-1 or equivalent. Jackscrew locking hardware is utilized. The standard HD68 connectors are still utilized by the SCSI tape drives.

2.7.2   SCSI Terminators

The SCSI bus must be properly terminated at each of its ends. The host adapter board is usually one terminus and is normally terminated. The other end usually appears at

the RLS and requires the installation of a LVD/SE SCSI terminator (Qualstar P/N 117-0011-9 or equivalent).

2.7.3 SCSI Termination Power

The RLS medium changer and each tape drive carrier can supply up to 2-amps of termination power to each SCSI bus. Current-limited solid-state switches that are under menu control supply all RLS termination power.

CAUTION

There should be only one device supplying termination power for any SCSI bus.

2.8   Q-Link Remote Manager

Q-Link is a feature consisting of hardware and additional firmware providing remote web accessed management capability to all RLS series tape libraries. It allows a user/supervisor to observe, configure, control and possibly trouble-shoot any RLS library remotely over the Internet or a LAN using Microsoft's Internet Explorer V6.0 or Netscape V6.2 browsers. The Mac interface has been certified using OS X Server (10.1.2) using Netscape V7.02 (Mozilla 1.0.2) for all functions except for writing data with the java applet interface.

Q-Link communicates to the outside world via a standard 10BaseT half-duplex interface found on all Fibre Channel Interface Personality Modules (IPMs) and optional on SCSI IPMs.

Q-Link provides the following features:

- Display Inventory and General Status
- Configure the RLS including Drives, SCSI, Logical Libraries
- Dump diagnostic logs
- Upload new RLS firmware
- Upload new Q-Link firmware
- Move inventory
- Clean or unload tape drives

Additionally, Q-Link can be configured to e-mail event or fault messages to a list of support staff when a name server and SMTP server are available.

2.9   2-GB Fibre Channel Interface

The native interface for the RLS Medium-changer and SCSI tape drives is LVD/SE SCSI. For RLS-8204D, 8216CD, 8236CD, 8236D, 8244D and 8444D models an optional 2-gigabit Fibre Channel SAN connection is available by changing the

standard SCSI Interface Personality Module (IPM) to the 2-GB Fibre Channel Bridge IPM, which provides communication and control with the Medium-changer. The 250-watt power module or dual redundant modules are required for use of a Fibre Channel IPM or external Fibre Channel Option with an RLS.

The FCB provides two LVD/SE-160 SCSI ports and a single Fibre Channel port utilizing either single-mode or multi-mode 2-gigabit, plug-in SFP's to match SAN requirements. The Medium-changer SCSI connection changes from a pair of HD68 connectors to a pair of VHDCI connectors to match those of the FCB. A single 18-inch VHDCI to HD68 SCSI cable is provided to connect the Medium-changer to the HD68 based tape drives.

The FCB is configured from either the RLS control panel or the Q-Link remote manager. New FCB operating firmware may be uploaded over the RS-232 port or over the SAN on Windows NT or Windows 2000 based platforms.

2.10   RLS Operating Features

2.10.1   Medium-changer Control

There are several microprocessors utilized throughout the RLS to form an efficient distributed control system. The Executive Processor provides master control. All of the microprocessors utilize FLASH memory for storing their operating firmware. In addition to its own needs, the Executive Processor firmware contains the firmware images for all of the other microprocessors in the RLS. Thus all of the RLS operating firmware gets updated with a single code load to the Executive Processor. This code load can be accomplished via the SCSI, Fibre Channel, Q-Link and Q-Conn interfaces.

2.10.2   Inventory Database

The Medium-changer maintains an Inventory Database that contains data associated with each cartridge location. The database contains such information as cartridge presence, barcode label data and cartridge source element address (the address where the cartridge came from – its source). The Inventory Database is maintained in non-volatile RAM and is always available to the host application.

2.10.3   Random and Multi-Sequential (Multiple Stacker) Operation

Each tape drive and cartridge storage location in the RLS may be configured through the menu system for Random or Sequential operation. If a tape drive is configured for the Random mode, it becomes a resource controlled by the application operating the library. If a drive is configured for Sequential mode operation, it is referred to as a sequential drive and is not included in the list of resources reported. Sequential drives are manually controlled via the library control panel menu system.

For Sequential or Recycle operation, a single contiguous range of cartridge locations is assigned to each sequential drive for its exclusive use. In these modes, each tape

cartridge is returned to its original storage location after it is ejected from the tape drive.

For Dual-Bin operation, two separate ranges of magazine locations are assigned to each sequential drive for its exclusive use. The Input range of locations is where the changer gets cartridges to be placed in the sequential drive. The Output range is where those cartridges are returned after the drive has ejected them.

Cartridge storage locations assigned to sequential operations are not included in the list of resources reported to host computers. Empty slots in a Sequential, Recycle or Dual-Bin drive's storage location range will not adversely affect operation.

When a Sequential or Recycle operation is initiated (via the menu system), the changer places the first cartridge, found at (or after) the initial specified storage location into the drive. When the drive ejects the cartridge, the changer automatically returns the cartridge to its original location. The changer then places the next cartridge found in sequence within the drive's storage range into the drive. This process is repeated until the last specified cartridge in the sequence is ejected and returned to storage. This sequence may be initiated at any location within a Sequential drive's storage range but will always end at the last storage location in the sequence. In Recycle operations, the handler will return to the starting position and repeat the cartridge movement cycle indefinitely.

When a Dual-Bin operation is interactively started (via the menu system), the changer moves the cartridge found at (or after) its Input First location into the drive. When the drive ejects the cartridge, the changer automatically places it in the first empty cartridge location in the drive's Output range. This process is repeated, until the last specified cartridge in the Input range has been ejected from the drive and placed into the Output range.

The computer communicating with the sequential drive only communicates with the drive and not the changer. This allows the use of applications lacking library-specific, cartridge-movement, operating software.

Multiple tape drives can be configured for concurrent Sequential, Recycle or Dual-Bin operation. All random drives, and all cartridge locations not assigned to sequential drives, are still available for simultaneous Random mode operations.

This flexible design allows the user to partition the library's resources to best meet overall system needs. With an RLS-8444, for example, it is possible to have one library serve as the tape storage device for four independent computer systems.

2.10.4 Manual Operation

The menu system provides a means of manually moving cartridges to or from all available locations (drives, magazine slots and VIOP slots). The menu system is accessed using the control keys on the front panel, or via the Q-Link or Q-Conn interfaces. If the host makes a request to the RLS during a manual operation, the RLS indicates it is busy until the manual operation is completed (usually within a few seconds).

2.10.5 Logical Libraries

The factory default configuration of all RLS units appears as a single library with all tape drives and storage slots dedicated to random operation. This is generally the correct configuration for a single system running a library aware backup application.

However, when multiple hosts are present and each host needs to support a library specific backup application, then the RLS can be sub-divided into smaller *logical libraries*. This masquerade can be done for a total of four logical libraries – thereby making a single logical library do the work of up to four smaller ones.

Logical library partitioning is only possible when the hosts and the Medium Changer use SCSI to communicate. This feature is not available when the Medium Changer is connected via Fibre Channel.

3. Specifications

Note that all specifications are subject to change without notice.

3.1 Dimensions

Model	"A" Dimension	"B" Dimension
XXX4	36.9" / 93.7 m	34.9" / 88.6 cm
All Others	32.1" / 81.5 cm	30.1" / 76.4 cm

Model	"C" Dimension Minimum	"C" Dimension Maximum
XXX4	27.5" / 69.9 cm	36.2" / 92.0 cm
All Others	22.0" / 55.9 cm	30.6" / 77.7 m

A

.7"
1.8 cm

16.6"
42.2 cm

C
(Rail Spacing)

2.0"
5.1 cm

B

Dual-Redundant, Hot-Swappable
Power Supply Option

19.0"
48.3 cm

8.75"
22.2 cm

10.0"
25.4 cm

8.0"
20.3 cm
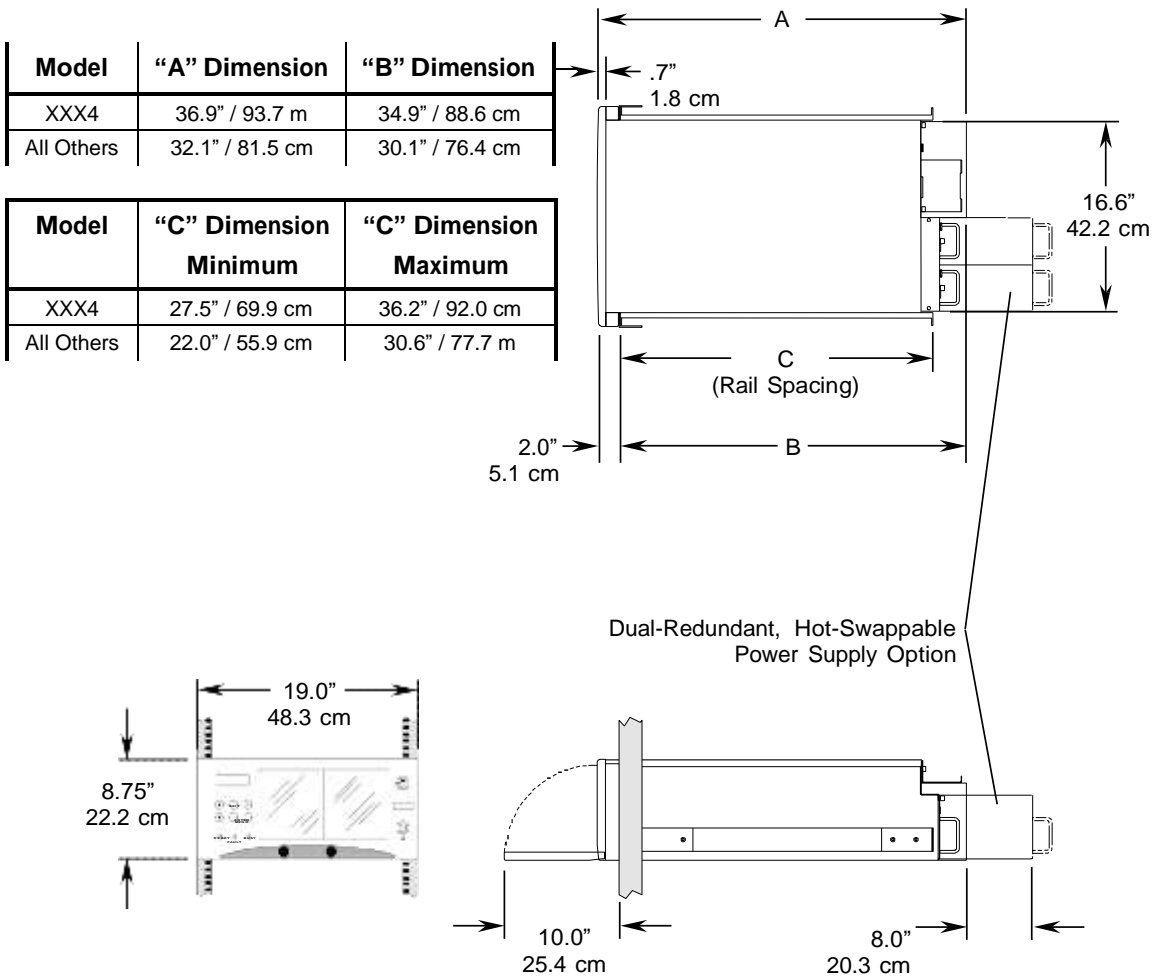
Figure 3-1   RLS External Dimensions

Note: Eight additional inches (20.3 cm) of depth are required to hot-swap the optional Redundant power supply modules.

3.2　Weight

MODEL	NET WEIGHT FULLY LOADED [(LBS / KG)	SHIPPING WEIGHT I (LBS / KG)
RLS-8204/8204D	147 / 67	177 / 80
RLS-8202/8216C/8216CD	104 / 47	132 / 60
RLS-8236/8236C/8236CD	114 / 52	142 / 64
RLS-8244/8244D	147 / 67	177 / 80
RLS-8444/8444D	151 / 69	181 / 82
RLS-8404/8404D	151 / 69	181 / 82

{ Includes rack slides and a full complement of tape drives, magazines and tape cartridges

I Not including tape cartridges

Table 3-1　**RLS Weights**

3.3　Standard AC Power Requirements and Consumption

The RLS operates with the following alternating current power sources (Mains):

Rated Line Voltage	Rated Line Current	Maximum Operating Line Voltage	Minimum Operating Line Voltage	Line Frequency Range
100–240 VAC	4-AMPS	254 VAC	90 VAC	48–62 Hz

Table 3-2　**RLS Mains Requirements**

Other than selecting the appropriate AC power cord for connection to the mains, the RLS requires no changes (switches, etc.) to operate from any input voltage within the rated line voltage.

Power consumption varies with the number of tape drives installed and the particular operation being performed. The peak power consumed for any model is 250 watts. All AC power supply modules utilize Power Factor Corrected (PFC) power supplies and thus the RLS' power factor is greater than 0.95 and complies with CE requirement EN61000-3-2.

MODEL	SCSI INTERFACE		FIBRE CHANNEL INTERFACE	
	IDLE	PEAK	IDLE	PEAK
RLS-8202/8216C/8216CD/ 8236/8236C/8236CD/8236D	85 watts 291 BTUs/hr	155 watts 530 BTUs/hr	100 watts 342 BTUs/hr	170 watts 582 BTUs/hr
RLS-8204/8204D/8244/8244D	95 watts 326 BTUs/hr	165 watts 565 BTUs/hr	110 watts 377 BTUs/hr	180 watts 617 BTUs/hr
RLS-8404/8404D/8444/8444D	140 watts 478 BTUs/hr	220 watts 751 BTUs/hr	155 watts 529 BTUs/hr	235 watts 802 BTUs/hr

Table 3-3 RLS Power Consumption

Power consumption varies with the number of tape drives installed and the particular operation being performed. Table 3-3 is based on a full complement of tape drives installed in each model specified. The idle power figures indicate the power consumed when the changer and tape drives are idle. The peak power figures indicate the peak power consumed when the carriage accelerates and the tape drives are active. The peak power levels are not expected to last for more than two seconds at a time. The current drawn from the power line (mains) is equal to the watts indicted in Table 3-3 divided by the AC voltage.

3.3.1   Power Source Disturbances

The RLS will continue to operate uninterrupted and without damage over a one-cycle line dropout. It is recommended that the RLS be powered from an Uninterruptible Power Source (UPS). The UPS should be rated to handle the maximum wattage. When the optional dual-redundant, hot-swappable power supply modules are utilized, it is recommended that they be connected to two separate UPS' for optimum system availability.

3.3.2   Power Entry

All RLS power supply modules have a line fuse and I.E.C. power receptacle mounted on the rear panel. An internal AC line filter reduces EMI conducted emissions and protects the RLS from any noise present on the power lines. A six-foot, seven-inch (2-meter) power cord is supplied for 120 VAC use in North America. A Harmonized HO5VV-F power cord is supplied for other destinations.

The redundant, hot-swappable AC power supply option includes redundant AC power cords to allow the RLS to be connected to independent power sources. The standard fuse for all models and line voltages is 5x20mm fast blow rated 250V 5A.

3.3.3 Power Cord

The supplied detachable power cord complies with the following specifications:

- **100-120 volt applications** UL listed and CSA certified three-conductor 18 AWG SJT vinyl-jacketed cord. One end is terminated with an IEC 320 C13 style connector. The other end is terminated with a NEMA 5-15P type plug.

- **200-240 volt applications** Harmonized three-conductor HO5VV F3G 1.0mm vinyl-jacketed cord. One end is terminated with an IEC 320 C13 style connector. The other end is terminated with the European CEE7 Standard VII type plug.

3.4   Temperature, Humidity and Altitude

PARAMETER	OPERATING	NON-OPERATING⁅
Ambient temperature	+5°C to +32°C (+41°F to +90°F)	-20°C to +60°C (-4°F to +140°F)
Temperature gradient (maximum)	1°C°/minute, 10°C/hour (2°F/minute, 18°F/hour)	1°C/minute, 20°C/hour (2°F/minute, +36°F/hour)
Relative humidity (non-condensing)	20% to 80%	10% to 90%
Wet bulb temperature	26°C (79°F) maximum	29°C (84°F) maximum
Altitude	-1000 to +10,000 feet -304.8 to +3,048 meters	-1000 to + 40,000 feet -304.8 to +12,192 meters

⁅ Includes tape drives

Table 3-4   Environmental Specifications

NOTE

Rapid changes in temperature that produce condensation must never be allowed since the condensed liquid may contaminate bearing lubricants and possibly shorten the expected Mean Time Between Failures.

3.5   Acoustical Noise

Overall noise level at one meter from the front of the RLS, shall not exceed:

- With all tape drives operating: ≤ 55 dBA

- All tape drives plus robotic handler operating: ≤ 60 dBA

4.   Unpacking

This chapter contains unpacking instructions for the RLS.

(Refer to Chapter 15 for instructions on repacking the RLS for shipping.)

DANGER

DEPENDING UPON THE MODEL, THE RLS WEIGHS OVER 150 POUNDS (68 Kg), EXCLUDING MAGAZINES AND CARTRIDGE DRIVES. IMPROPER LIFTING TECHNIQUES CAN RESULT IN BACK INJURY AND/OR EQUIPMENT DAMAGE. GET HELP WHEN LIFTING OR MOVING THE RLS.

GEFAHR

ABHAENGIG VOM MODELL BETRAEGT DAS GEWICHT DER RLS OHNE MAGAZIN UND CASSETTENLAUFWERK ÜBER 68 KG (150 POUNDs). FALSCHES TRAGEN KANN ZU PERSONENVERLETZUNGEN UND/ODER ZU BESCHAEDIGUNGEN DES GERAETES FUEHREN. TRAGEN ODER BEWEGEN SIE DAS GERAET NIE OHNE MINDESTENS EINE ZWEITE HILFSPERSON.

The units are shipped in a specially designed carton with energy absorbing end blocks. The following standard items are included:

• RLS Tape Library

• One Power Cord

• Two Door Keys

• The printed Installation and Operation Manual (this document)

• A full complement of empty magazines with dust covers

• Round SCSI bridge Cable* (connects Medium-changer to tape drive)

• HD68 SCSI Terminator

The following items are ordered separately and may be enclosed:

• Second Power Cord when the Dual-Redundant Power Supply option is installed

• Additional magazines with dust covers

• Tape cartridges

• Rack mount slide kit

* Not included with RLS-8204D, 8216D, 8236CD, 8236D 8244D, 8404D and 8444D libraries.

Refer to Figure 4-1 and Figure 4-2.

With the help of an assistant, follow the instructions below.

1.   Orient the shipping carton with the topside up.

2.   Cut the packing tape and open the top of the carton (item 1).

3.   Fold the flaps of the carton down (item 2).

4.   Lift the accessory pack and rack slides pack out of the carton (item 2).

5.   Two people should grasp the RLS from the sides and lift it along with its four Inserts out of the carton (item 3).

6.   Remove the four inserts (item 4).

7.   Remove the plastic bag from the RLS (item 5).

8.   Remove the foam block from the rear of the RLS on all models except the RLS-8204, RLS-8204D, RLS-8244, RLS-8244D, RLS-8444 and RLS-8444D (item 5).

9.   Locate the keys to the front panel lock in the accessory pack.

10.   Hold the front panel with the left hand while unlocking it with the key in the right hand (lock is found in the upper right corner, turn clockwise ¼-turn).

11.   Remove the key.

12.   Lightly pull on the top corners of the front panel until it's fully open (item 6).

13.   Carefully remove the Door Latch Foil (item 7).

14.   Unload the accessory pack and rack slide pack.

15.   Place <u>all</u> shipping materials back into the shipping carton for future use.

1

Shipping Carton

2   Rack Slide Pack   Accessory Pack

3   Lift Here

4   Inserts
4 Total

Remove Foam Block

Remove Plastic Bag

5   Door Latch Foil

6   Unlock with Key
Then Pull Open

7   Remove Door Latch Foil

8
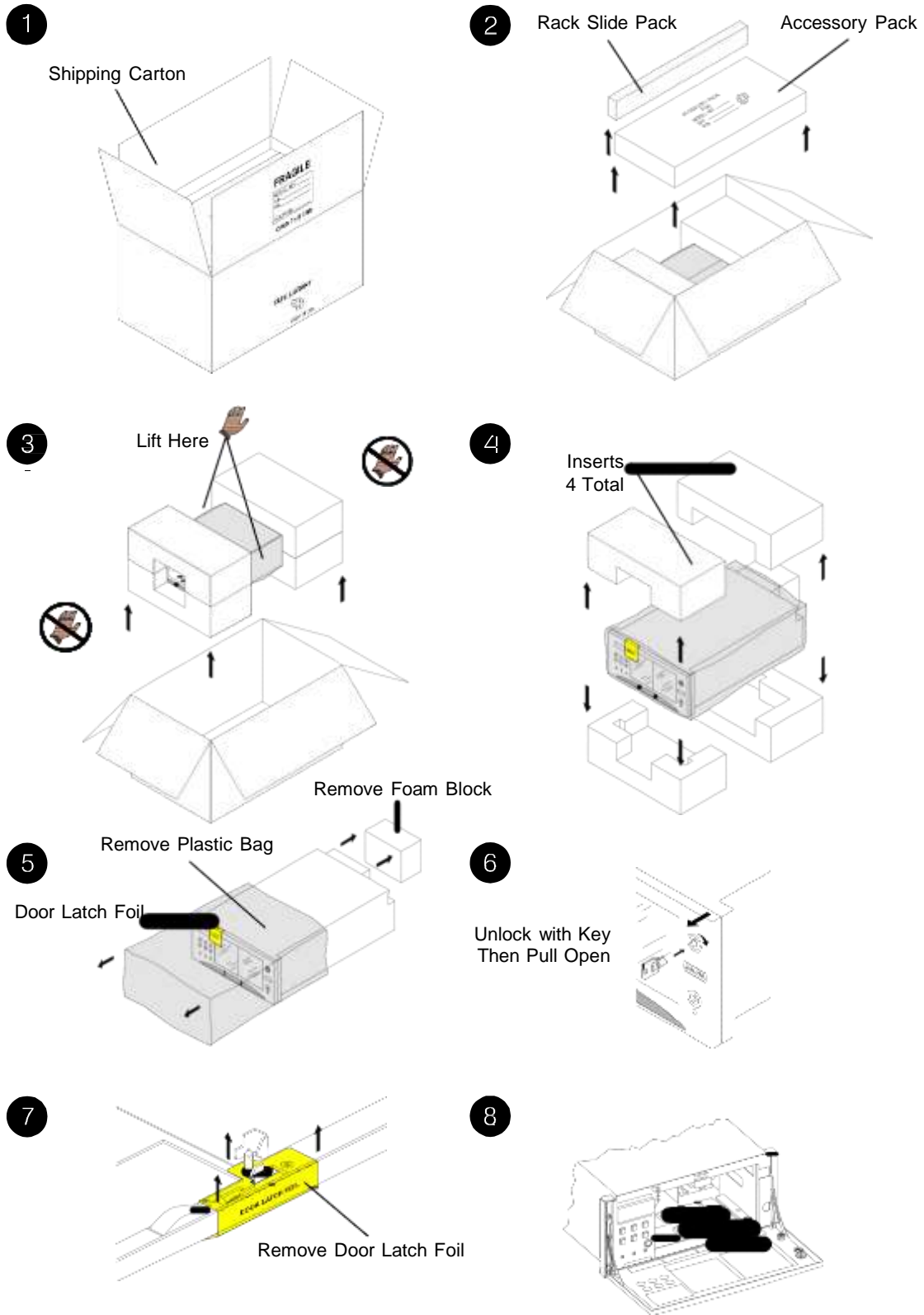
Figure 4-1   Unpacking the RLS – All models except the RLS-8204, 8204D, 8244, 8244D, 8444 & 8444D

1 Shipping Carton

2 Rack Slide Pack · Accessory Pack

3 Lift Here

4 Inserts 4 Total

5 Remove Plastic Bag · Door Latch Foil

6 Unlock with Key Then Pull Open

7 Remove Door Latch Foil

8
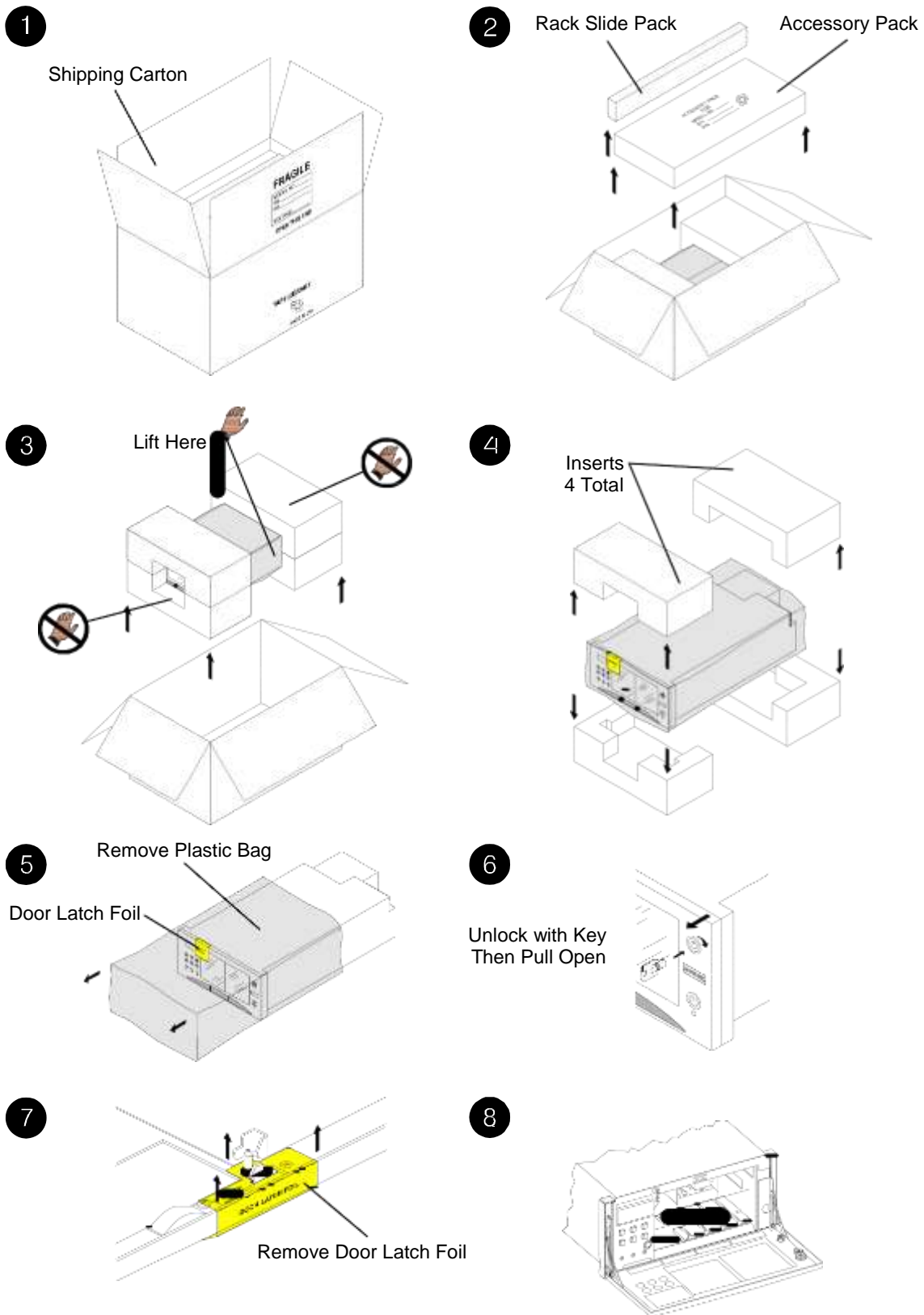
Figure 4-2   Unpacking the RLS-8204, 8204D, 8244, 8244D, 8444 & 8444D

5. Installation

5.1 Installation Considerations

When selecting a location for the RLS, be sure to consider the unit weight and provide a stable operating location. These tape libraries are not intended for use in mobile applications. They were designed for use in an office environment. Also remember to provide sufficient free space around the unit to allow for loading/unloading media/drives, establishing cable connections, and airflow considerations.

5.1.1 Operating Environment

The RLS is designed to operate in an ambient environment from 41°F to 90°F (5°C to 32°C), 20% to 80% relative humidity, and at altitudes from -1000 to +10,000 feet. Moisture must not be allowed to condense inside the system. The RLS should only be operated in a dust-free environment.

5.1.2 Ventilation

The RLS draws fresh cooling air in from the bottom of the front panel/door through a filter and exhausts warm air out the rear. See Figure 3-1 for the outline drawing and dimensions. See Table 3-3 for the heat contribution (BTU/hour) of your model.

5.1.3 AC Power Requirements

RLS models have peak power consumptions of between 150- and 300-watts. All AC powered models utilize Power Factor Corrected (PFC) power supplies to the primary VA requirements are the same as the peak watts. See Table 3-3 for the power requirements of your model.

5.1.4 DC Power Requirements

All DC powered RLS models have peak power consumptions of between 150 and 300 watts.

5.2 Quick Check

We recommend powering up the RLS at this time to see that it's functional and has not sustained any damage in shipping.

1. First visually inspect the unit for obvious shipping damage. Any dented surfaces indicate damage that may result in a damage claim with the carrier.

2. Turn the RLS on each side to check for loose objects inside. Any noises emanating from the unit indicate something loose inside. This should be thoroughly investigated and resolved before applying power and proceeding.

3. Attach the power cord to the RLS and the mains supply. On units with dual-redundant power supply modules, the two modules should be powered separately for this test.

4. Press the power switch in the lower right corner of the front panel/door. The fans should start, the Power Indicator, Display and the RLS interior should illuminate followed by some carriage motion. The RLS will then perform its Power-On Self Test. When completed, the Display will indicate the RLS model number on the top line. Any Alarm messages indicate a problem that must be resolved.

5. Press the power switch to turn off power. Then remove the power cord.

6. For units with dual-redundant power supply modules, move the power cord to the other power supply module and repeat steps 4 and 5.

5.3 Opening the Front Panel/Door

When the RLS is powered on and a host computer has not set the Prevent Media Removal state, then the front panel/door can be opened by following the steps below:

1. Unlock the front panel/door with the key. See Section 6.2.

2. Press the ∼ key to open the Quick Operation Menu. The ∼ key only works when the RLS is not already in the menu system. To exit the menu system (from any menu), press the MENU key twice.

NOTE

There are two choices when opening the front panel/door. The OPEN & PARK LEFT command unlocks the front panel/door and moves the carriage to it's far left position. This command should be used when accessing the tape drives. The OPEN & PARK RIGHT command unlocks the front panel/door and moves the carriage to it's far right position. This command should be used when accessing the carousel or storage array. These menu commands will not be displayed if the door is locked with the key or a Prevent Media Removal command has been received.

3. If the OPEN & PARK LEFT command is desired, simply press the ENTER key.

4. If the OPEN & PARK RIGHT command is desired, press the W key to select OPEN & PARK RIGHT, then press the ENTER key.

5. After either command is activated, the front panel/door will unlock automatically.

6. After the carriage has stopped, gently pull the front panel/door open.

If the RLS is not powered on or is malfunctioning the front panel/door can be opened by following the steps below:

1. Unlock the front panel/door with the key. See Section 6.2.

2. Insert the straightened end of a paper clip into the Emergency Unlatch Hole in the front panel/door as shown in Figure 5-1.

3. The front panel/door will unlock once its mechanism has been activated.

4. Gently pull the front panel/door open.
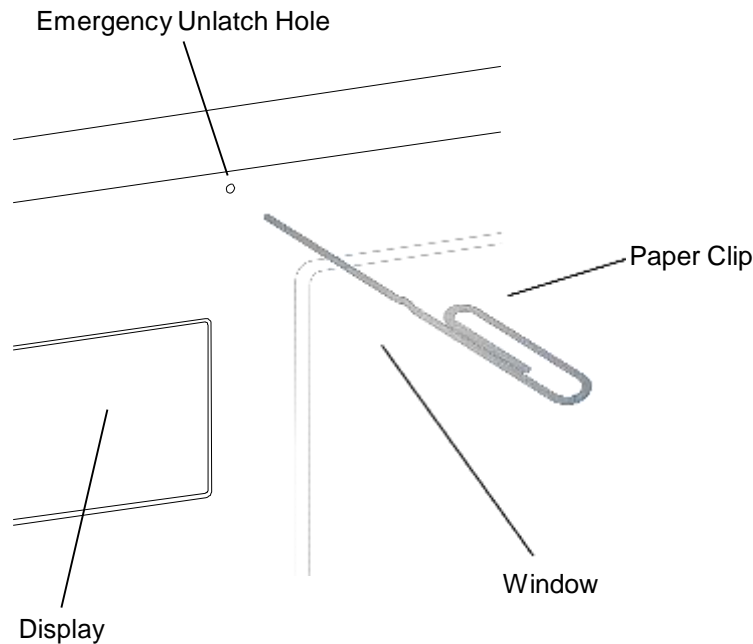
Figure 5-1   View of the Hole in the Front panel/door

5.4   Tape Drive Installation

All tape drives used in the RLS are factory installed in a drive carrier assembly. This assembly is pre-tested and ready to plug into the RLS drive bay. RLS units are normally shipped with the drive carrier assemblies installed and ready to run. However, if you are installing your own drives, this section will lead you through the process. This procedure is also used when replacing a tape drive. Drives may be installed and removed while RLS power is on. If an RLS does not have all of its tape drives installed, drive fillers must be installed in the empty drive bays. See Section 5.4.4.

Tape drive types should not be mixed. Each supported tape drive requires specific media recommended by the drive's manufacturer. Be certain that all tape drives are of the same make and model.

5.4.1   Installing a Tape Drive

NOTE

Drives can be installed with the RLS powered on or off. If the RLS is not powered or malfunctioning, the front panel/door may be opened by inserting a straightened paper clip into the hole in the front panel/door. See Figure 5-1 in Section 5.3.

1. Open the front panel/door as described in Section 5.3.

2. If the RLS is not powered, push on the right side of the carriage to move it to the left and out of the way of the tape drives.

3. Orient the drive as shown in Figure 5-2. Make sure that the guiding features located on the bottom of the drive are aligned with correct slot in the RLS.
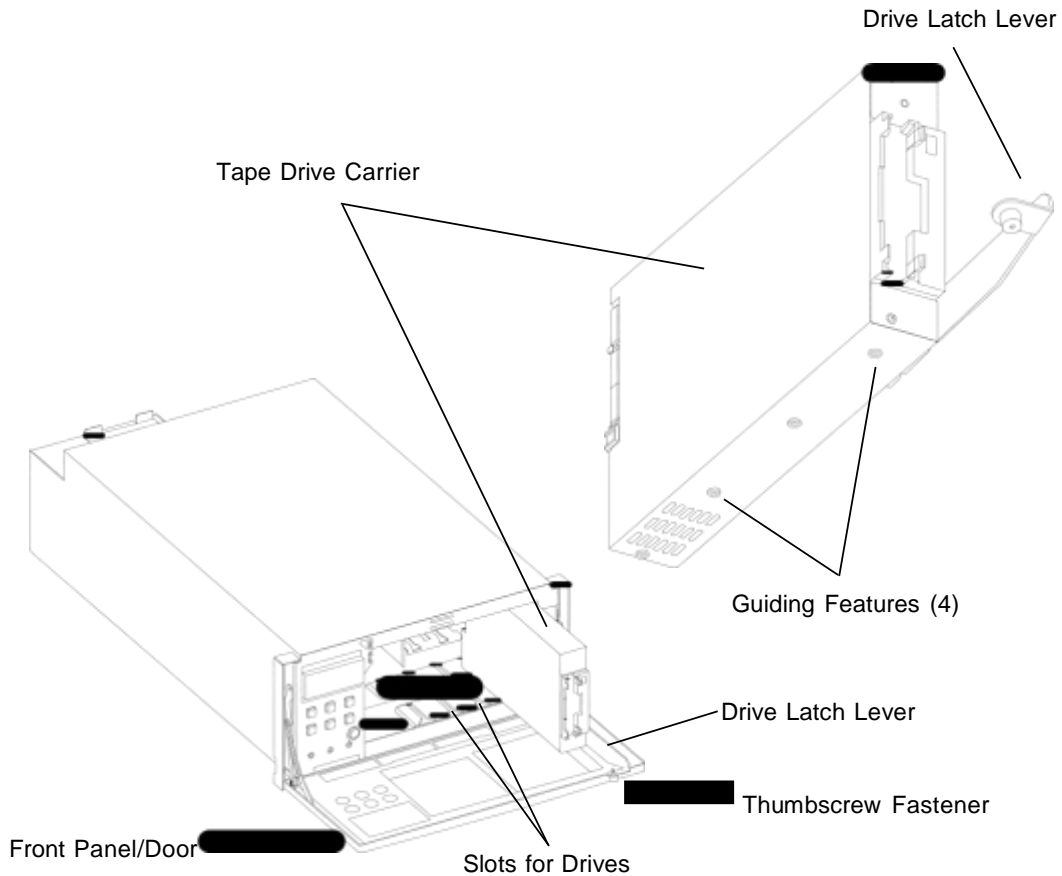
Figure 5-2   Drive Carrier Orientation

4. With the drive latch lever completely down slide the drive into its slot gliding on the bottom of the carrier. Press until it stops moving. The Inventory Sentry alarm may sound. This is okay, as the inventory will get rescanned when the front panel/door is closed.

CAUTION

The RLS can be damaged by operating the latch lever prematurely or by using excessive force.

5. Lift the drive latch lever up, but do not use force. A detent should be felt about half way through the lever's travel. Engage the thumbscrew fastener.

6. Rotate the thumbscrew fastener clockwise with the left thumb and index finger until it is tight.

7. Using both hands, close the front panel/door.

8. Proceed to Section 5.4.3

5.4.2   Removing a Tape Drive

1. Open the front panel/door as described in Section 5.3.

2. Using your thumb and index finger, rotate the thumbscrew faster counter-clockwise until the lever pops open. Reaching in may sound the Inventory Sentry alarm. The inventory will get rescanned when the front panel/door is closed.

3. Gently move the lever down to the bottom of its travel.

4. Pull the drive all the way out and set it down gently.

5. Using both hands, close the front panel/door.
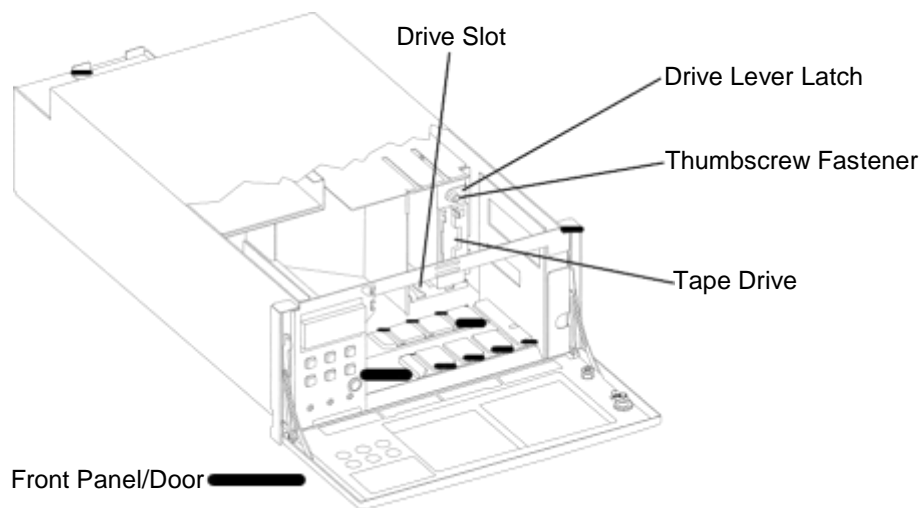
Figure 5-3   Drive Carrier Insertion/Removal

5.4.3 Verifying a Tape Drive Installation

Follow this procedure to verify the newly installed tape drive has been recognized by the RLS:

1. Press the MENU key.

2. Press the ENTER key to enter the Configuration menu.

3. Press the W key to select Drive, then press the ENTER key.

4. The drive numbers (model dependent) will be displayed along with the drive's status on the right. A status of NONE indicates an empty tape drive position or the failure of the RLS to recognize the drive. You will have to press the W key twice to see drives T3 and T4 with an RLS-8404/8404D or 8444/8444D. A properly installed drive will indicate a status of RANDOM or DISABLED.

5.4.4 Drive Fillers

If an RLS does not have all of its tape drives installed, drive fillers must be installed in the empty drive bays. The appropriate amount of drive fillers for empty drive bays were included with the RLS if it was ordered without a full compliment of tape drives. Please contact Qualstar Technical Support if additional drive fillers are required. There are two sizes of drive fillers designed to match the width of the various tape drives. See Figure 5-4.

Drive Filler installed in an RLS.

Drive Filler

Tab

RLS-8404, 8404D, 8444& 8444H = P/N 510437-01-5

RLS-8202, 8204, 8204D, 8216C, 8216CD, 8236, 8236C, 8236CD 8236D, 8244 & 8244D = P/N 510430-01-0
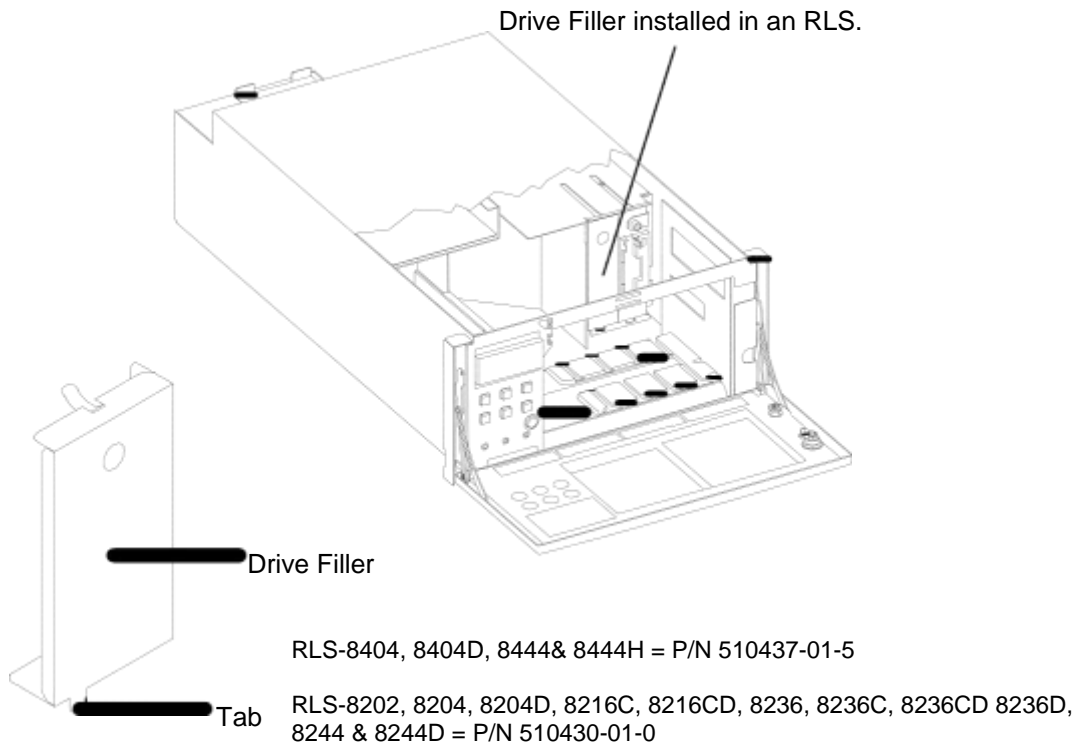
Figure 5-4   Drive Filler Installation

Follow this procedure to install drive fillers in empty drive bays:

1.   Open the front panel/door as described in Section 5.3.

2.   Insert the drive filler into the empty drive bay making sure that the tab is inserted into the drive slot. See Figure 5-3 for a view of the drive slot location.

3.   Tilt the drive filler upwards and back towards the rear of the library until it is vertical and fits securely in the drive bay.

4.   To remove a drive filler gently pull it backwards and downward until it is free from the drive bay.

5.5   Media Handling Precautions

5.5.1   General Precautions

Note that tape cartridges are fragile and can be damaged if mishandled. Observing the following guidelines will help to prevent damage to tape drives and/or tapes cartridges.

- When outside of a library, always keep tape cartridges in either their protective plastic case or a covered magazine.

- When carrying more than one LTO cartridge, always orient the cartridges the same way and stack them together. Their cases are designed to interlock to each other to prevent them from slipping apart.

- Never stack the tape cartridges more than five high.

- Before a cartridge is inserted into a tape drive, it should be allowed to acclimate to the operating environment for at least 24 hours. This may be done in the same room as the library or inside the library. Inserting a very hot or cold cartridge into a tape drive could damage both the cartridge and the drive.

- The ideal archival environment for storing tape cartridges is at a temperature range of 64°-79° Fahrenheit and a relative humidity of 40 to 60 percent.

- Make sure to stand each cartridge vertically, when placing them in archival (long term) storage. This means that magazines with cartridges should be stored in a horizontal orientation.

- Avoid placing tape cartridges near any source of high intensity magnetic fields, such as monitors or electric motors.

- Never apply adhesive labels to the tape cartridge anywhere except in the recess provided on the front side (same side as the write-enable/protect switch). Labels applied elsewhere could cause the cartridge to become jammed inside a tape drive or magazine.

- Only use ink when writing on labels. Lead pencils, grease pencils, etc. can produce debris that can cause data errors.

- Do not carry cartridges loosely in a container. Allowing them to bang together creates undesirable physical shock.

- Do not touch or allow direct contact with the tape or tape leader. Dust or natural skin oils can contaminate the tape and impact performance.

- Do not expose the tape cartridge to moisture or direct sunlight.

- If a cartridge has been dropped, do not load it into a tape drive as the drive could be damaged.

5.6 Installing Media

5.6.1 Static Precautions

Before handling tape cartridges, it is a good idea to eliminate any static charge that may exist. To protect the data stored on the tape cartridges, just follow this simple procedure before loading, moving, or removing any tape cartridges: touch the rack the RLS is mounted in, or if it's not rack mounted, touch one of the bright screws on the cabinet sides just prior to handling the media.

5.6.2 Media Selection

The choice of media for use in the RLS is important. Only media approved by the tape drive manufacturer and Qualstar should be used in the RLS. Non-approved media can cause numerous hidden problems that aren't readily apparent. Media sold by Qualstar is certainly approved for use in the RLS. Please refer to Product Information Note #038 for the current list of approved media sources.

5.6.3 Write Enable Tabs

All of the tape formats supported by the RLS utilize Write Enable Tabs that determine if the tape can be written upon. When disabled or protected, tapes can only be read – not written or appended.

The following figure depicts the Write Enable Tabs for LTO media. Brand new media must be write enabled for obvious reasons.

IBM
Tape Cartridge

Write Enable/Protect
Tab Window
(shown unlocked)

HP
Tape Cartridge
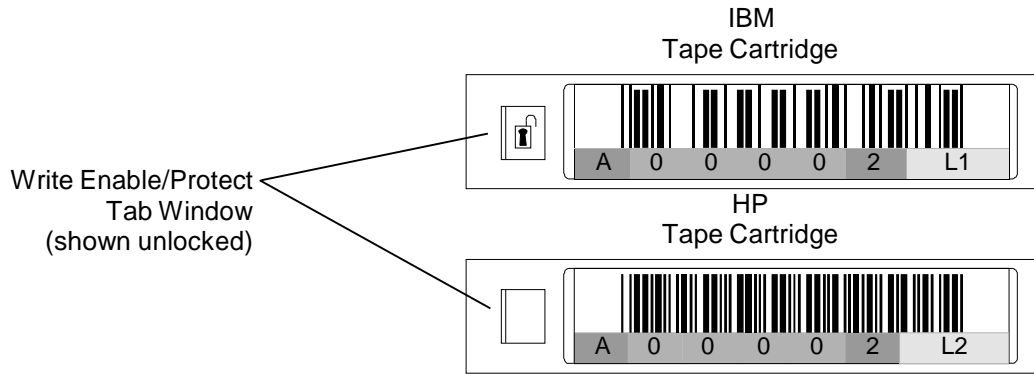
LTO cartridges are write protected when the Enable/Protect tab is moved to the right. Cartridges will show a "locked" symbol on the face of the tab.

Figure 5-5   LTO Media Write Protect Tab

5.6.4   Loading a Magazine with Tape Cartridges

Magazines may be loaded prior to or after installation in the RLS. For the initial magazine load, it's faster and easier to load the magazines with tape cartridges prior to installing them into the RLS. Make certain that cartridges are properly oriented, and for new media, be certain to set the Write Enable tab to its enabled position before installing. Refer to Figure 5-6 for LTO loading.

Record-Protect Tab

Slots

Shown in the recordable position.
(Read-Only is when the tab is closed)
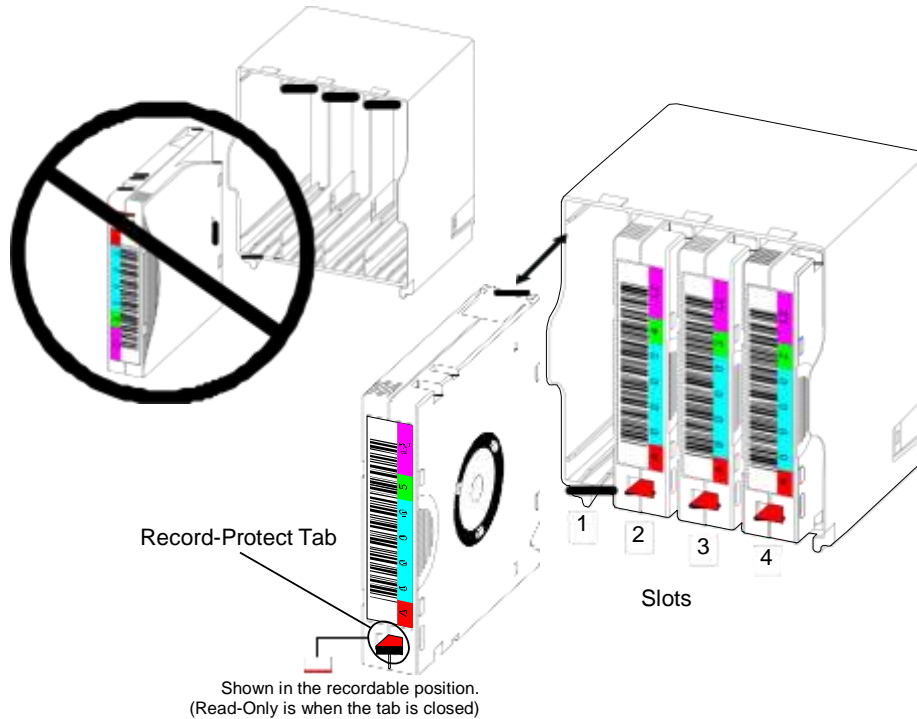
Figure 5-6 Loading LTO Media into a Magazine

5.6.5 Bulk Loading Media in Magazines

NOTICE

Be sure to remove a magazine's dust cover before installing it and remember to attach the cover after removing a magazine. Check to verify tape cartridges are properly oriented and fully inserted before installing a magazine into the RLS.

Magazines are easily installed and removed without the use of tools. Follow this procedure to install or remove a magazine:

1. Press the ~ key to open the Quick Operation Menu

2. Press the W key repeatedly to select (UN)LOAD LIBRARY

3. Press the ENTER key. The Carousel or Storage Array (model dependent) may rotate to the first magazine position followed by the opening of the front panel/door.

Reaching into the RLS to install a magazine breaks the Inventory Sentry Beam and causes an audible alarm. This is expected and will invalidate the inventory. The RLS will automatically take inventory once loading is complete.

4. To install a magazine, carefully slide it onto the magazine mount and push <u>until the click of the latch is felt or heard</u>. Failure to latch the magazine in place can result in carousel or storage array malfunction.

5. Close the front panel/door with both hands. The Carousel or Storage Array will automatically move to the next magazine mount and then the front panel/door will open.

6. Repeat steps 4 and 5 until all the magazines are loaded. If you don't want to load any given magazine, simply close the front panel/door without loading that magazine.

5.6.6   Installing or Removing Individual Magazines or Tapes

NOTICE

Be sure to remove a magazine's dust cover before using it and remember to attach the cover after removing a magazine. Check to verify tape cartridges are properly oriented and fully inserted before installing a magazine into the RLS.

Magazines are easily installed and removed without the use of tools. Follow this procedure to install or remove a magazine:

1. Press the MENU key.

2. Press the W key twice to select `OPERATION`, then press the ENTER key.

3. Press the W key repeatedly to select `Position Magazine`, then press the ENTER key four times. The cursor is now over the Magazine Letter.

4. Use the arrow keys to select the desired magazine letter. Note that a magazine used for the VIOP will have an I prefix instead of an M. This is immaterial; it's the magazine letter that matters. When the desired magazine is selected, press the EXIT key.

5. Press the W key to select `POSITION`, then press the ENTER key. The Carousel or Storage Array should move to the desired magazine position.

6.   Press the MENU key twice to exit the menu system.

7.   Press the ~ key to open the `Quick Operation Menu` followed by the ENTER key to open the door.

8.   Open the front panel/door and install or remove the magazine or tape cartridge(s). The carriage may be gently pushed aside to improve access.

9.   Close the front panel/door. The RLS will rescan its cartridge inventory.

10.   Repeat steps 1 through 9 as needed.

5.7   Tabletop Installation

The RLS comes equipped with rubber feet pre-mounted on its bottom, making it ready for tabletop installation. These feet should be removed for rack installation.

5.8   Rack Mounting

The RLS is designed to mount in an industry-standard 19-inch wide rack. Skip this section if the RLS will be used in a tabletop environment. Note that the RLS-8204, 8204D, 8244, 8244D, 8404, 8404D, 8444 and 8444D models use a different set of rack slides than the other RLS models to accommodate their longer chassis. The rack mounting procedures have been divided into two separate sections. See Section 5.8.4 if you are installing an RLS-8204, 8204D, 8244, 8244D, 8404, 8404D, 8444 and 8444D or Section 5.8.3 for all other models.

DANGER

THE RLS WEIGHS UP TO 150 LBS (68 KG) AND TWO PEOPLE ARE NEEDED TO LIFT IT. HANDLING THE RLS ALONE COULD RESULT IN BACK INJURY OR OTHER ACCIDENTS.

5.8.1   Cautions

Check the following points before rack mounting the RLS.

- When installing the library, keep cables and other obstructions away from the area around the fans on the rear of the library and the ventilation slots on the front of the library.

- When the library is mounted in a rack, the balance of the rack could be affected and the rack could tip over. To prevent this from happening, we recommend securing the rack with brackets that are designed to keep it from tipping over.

- Confirm that the correct AC power is supplied within the rack and its outlet is properly grounded.

5.8.2 Preparing the Library for Rack Mount Installation

There are two halves to each rack slide – the inner and outer slides. These will first be attached to the RLS and rack respectively before the RLS is installed in the rack.

5.8.3 Rack Mounting RLS-8202, 8216C, 8216CD, 8236, 8236C or 8236CD Libraries

5.8.3.1 Required Tools

- No. 2 Philips screwdriver

- Standard blade screwdriver

- 5/16-inch Open End Wrench

5.8.3.2 Pull Out the Inner Slide

Pull out the inner slides from the slide assembles.

1. Place a slide assembly on a flat surface with the back of the slide assembly facing up. Pull out the inner slide from one of the slide assembly as far as it will go. The slide can be extended until the locking arm on the back of the slide emerges. Refer to Figure 5-7.

Back of Slide Assembly

Locking Arm
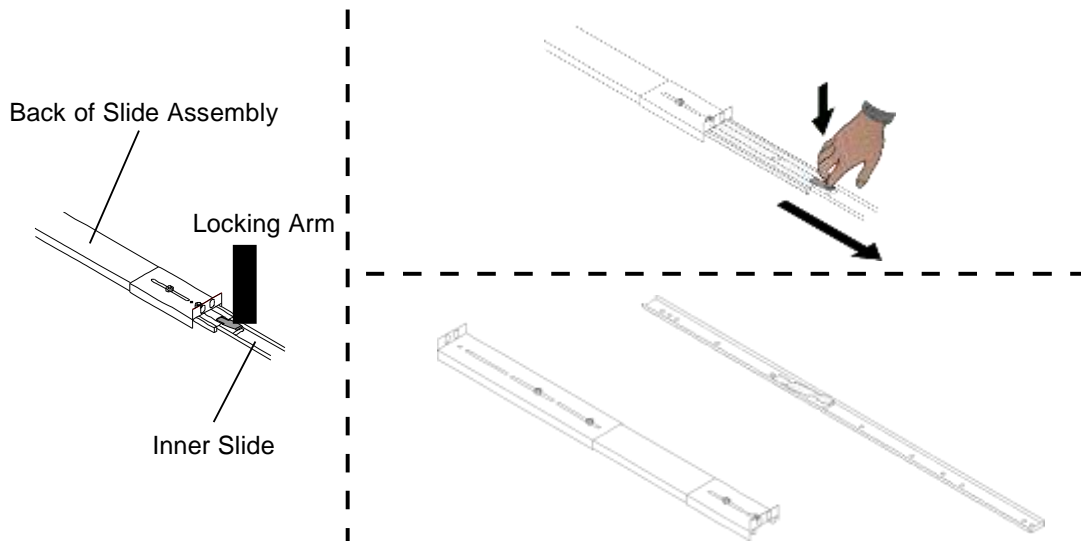
Inner Slide

Figure 5-7   Removing the Inner Slide from the Slide Assembly

2. Press the locking arm to release the lock, and then pull the inner slide all of the way out. Refer to Figure 5-7.

3. Repeat the process with the other slide assembly, pulling out its inner slide.

NOTE

The inner slide will be mounted on the RLS, while the slide assembly will be mounted on the rack.

5.8.3.3 Mounting the Inner Slides on the Library

CAUTION

Using screws longer than the lengths specified below can result in permanent damage to the RLS, its media or tape drives.

1. Use four or five (model dependent) of the supplied 8-32 x 1/4-inch Phillips head screws to mount an inner slide on the library as shown in Figure 5-8. Make sure that the open end of the inner slide is towards the rear of the library.

2. Mount the other inner slide on the other side of the library in the same fashion.

Open End of Inner Slide

4 8-32 x 1/4-inch Screws
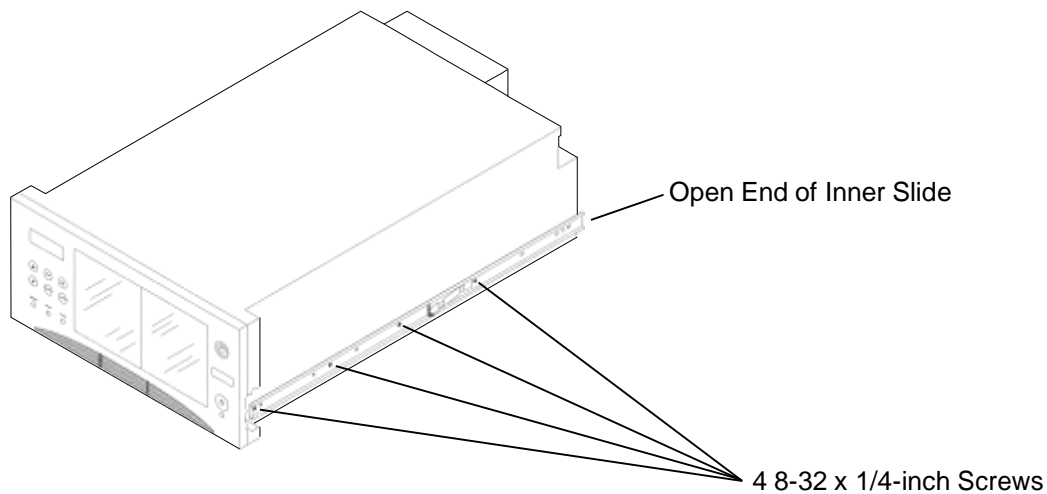
Figure 5-8   Inner Slide Mounted on the Side of the Library

5.8.3.4 Preparing the Rack

Each slide assembly has both a long and short mounting bracket attached to it that needs to be adjusted to match the distance between the front and rear rack posts.

5.8.3.5 Mounting the Slide Assemblies on the Rack

1. Decide where the slide assemblies are to be mounted. We recommend marking the position where each slide assembly bracket is to be mounted.

2. Position a slide assembly between the front and rear rack posts to determine how far the brackets need to be moved so that the mounting holes of the brackets will be in contact with the inside edge of the rack posts. Note that the long bracket must be mounted at the rear of the rack. Refer to Figure 5-9.

Rear Rack Post

Slide Assembly

Long Bracket

Mounting Bracket Tabs
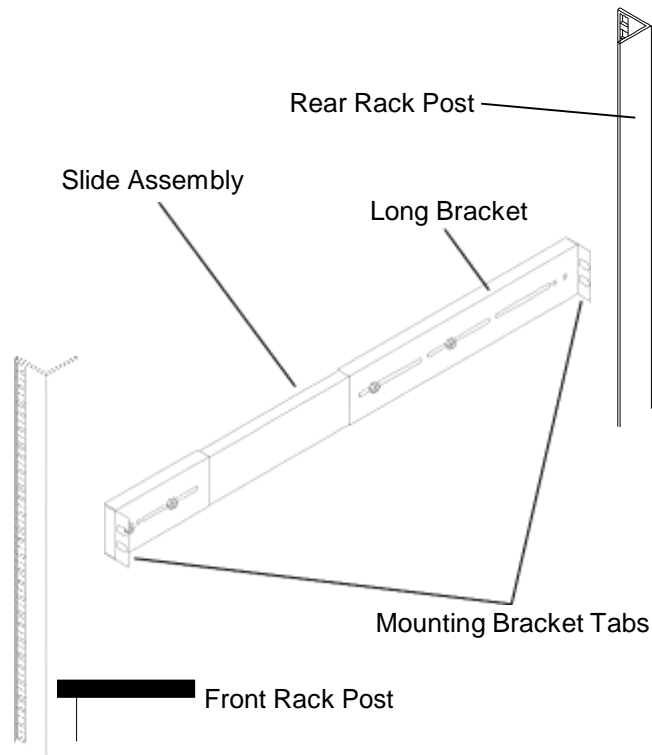
Front Rack Post

Figure 5-9 Slide Assembly Between the Front and Rear Rack Posts

3. Each slide assembly bracket has two screws with washers and nuts that are used to position the brackets. To move a bracket, slide the slide assembly until the two screw heads are exposed and then use a standard blade screwdriver to remove the two screws, being careful to not drop the washers and nuts. Next, slide the bracket and then reinstall the screws, using the two washers and nuts, into holes in the slide assembly. Be sure that each bracket has both screws and nuts attaching it to the slide assembly.

Remove the screws, washers and nuts using a standard blade screwdriver and 5/16" wrench.

Move the bracket.
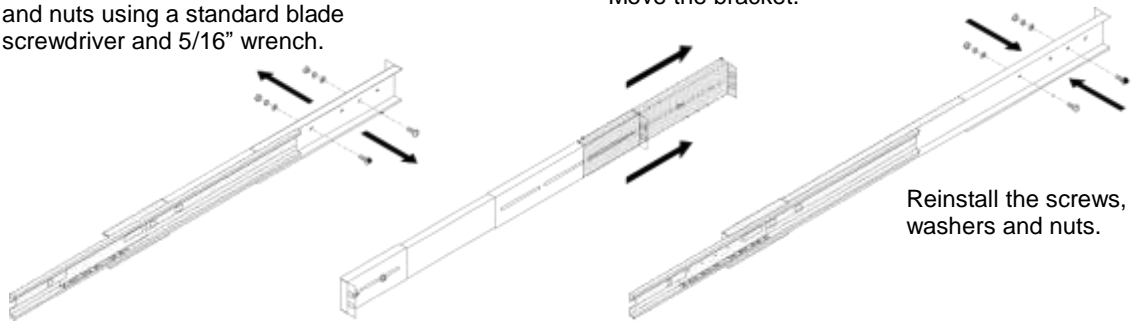
Reinstall the screws, washers and nuts.

Figure 5-10   Adjusting the Location of the Slide Assembly Brackets

4. When one slide assembly has had its brackets moved so that they are in contact with the inside edge of the rack posts, reposition the brackets on the other slide assembly to match.

5. Position a slide assembly between the front and rear slides so that the brackets are touching the inside of the slides and the holes in its brackets align with the mounting positions chosen in Step 1. Make sure that the mounting bracket tabs are facing towards the outside of the rack and that the long bracket is at the rear of the rack. Refer to Figure 5-11.

6. Using the hardware that was supplied with the rack, attach the slide assembly to the rack using all four mounting bracket holes on each slide assembly. Tighten the hardware securely.

7. Using a standard blade screwdriver and 5/16-inch open-end wrench, tighten all of the screws and nuts that were loosened in Step 3 when the brackets were moved on the slide assembly.

8. Repeat Steps 5 through 7 to attach the remaining slide assembly to the rack.

Figure 5-11 contains labels: Rear Rack Posts, Slide Assemblies, Front Rack Posts, Long Bracket, Hardware that was supplied with the rack.
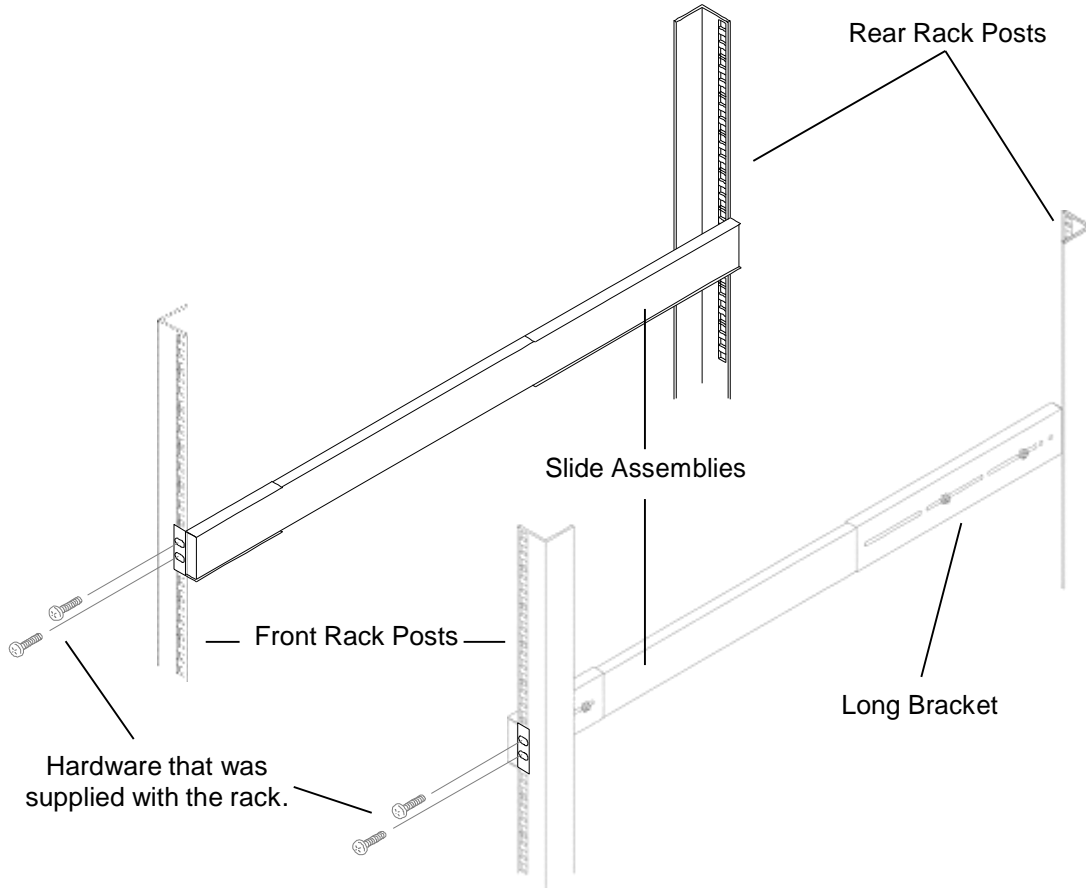
Figure 5-11   Slide Assemblies Being Attached to the Front and Rear Rack Posts

5.8.3.6   Mounting the Library in the Rack

DANGER

THE RLS WEIGHS UP TO 150 LBS (68 KG) AND TWO PEOPLE ARE NEEDED TO LIFT IT. HANDLING THE RLS ALONE COULD RESULT IN BACK INJURY OR OTHER ACCIDENTS.

1. Remove any rubber feet that may be attached to the bottom of the RLS.

2. Pull the straight slides out from the slide assemblies. Refer to Figure 5-12.

3. Have two or more people lift the library, fit the inner slides into the straight slide portion of the slide assemblies, and then slide the inner slides to the locking arm positions. The library will not slide past the locking arm positions.

4. Press the locking arms on both slide assemblies to release the locks, and then slide the library all the way into the rack. Refer to Figure 5-14.

Figure 5-12   Straight Slide Extended from the Slide Assembly
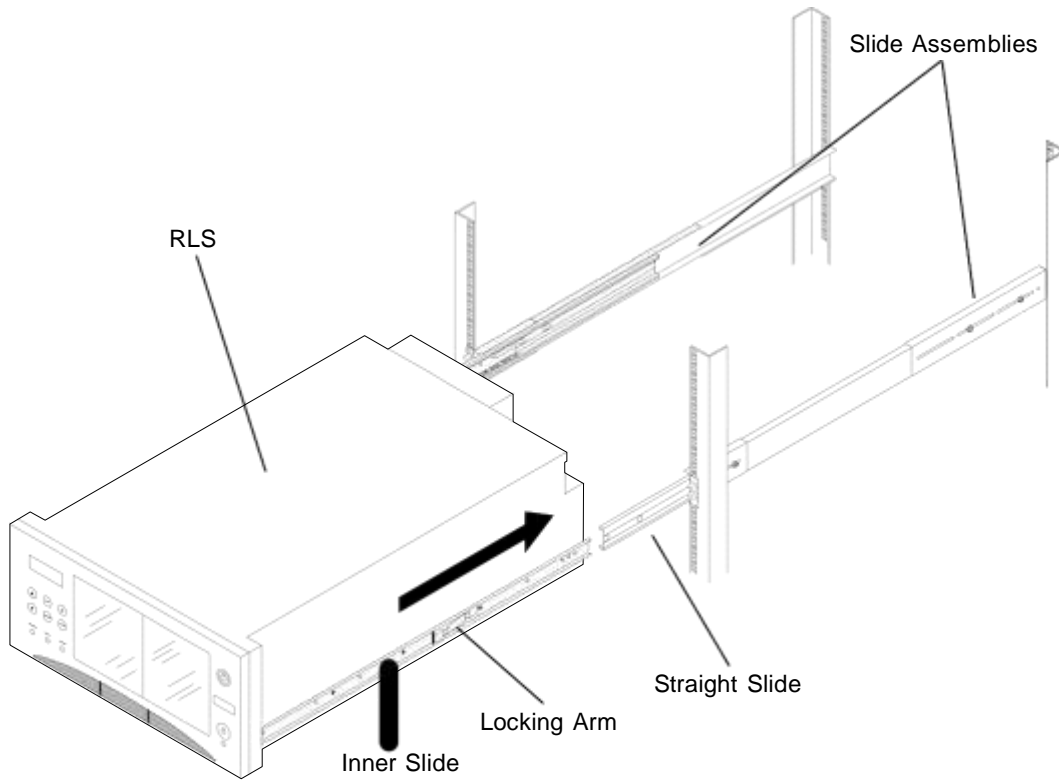
Figure 5-13   Library in Position to be Attached to the Slide Assemblies

Locking Arm

Press here on the Locking Arm to release the lock.
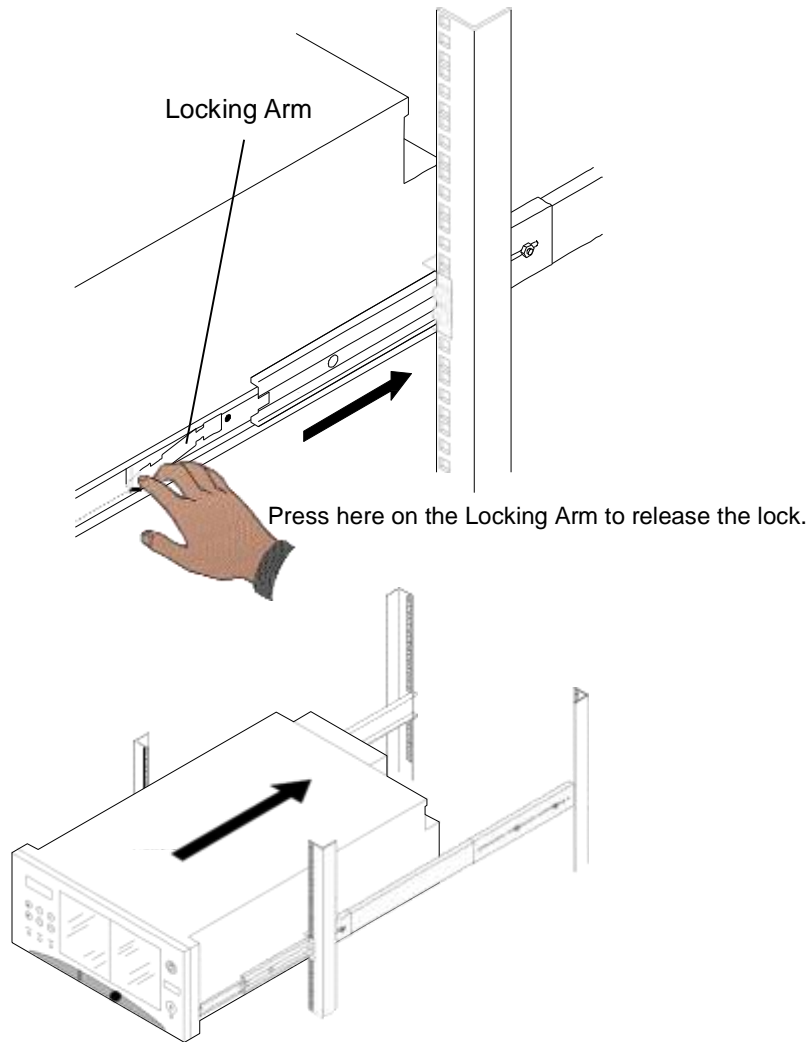
Figure 5-14 Detail of Locking Arm When Installing Library

5. Attach the power cord to the RLS and the mains supply.

6. Press the power switch in the lower right corner of the front panel/door. The RLS will then perform its Power-On Self Test.

7. Open the front panel/door as described in Section 5.3.

8. Confirm that the library is housed properly in the rack.

NOTE

Two 10-32 x 1/2-inch pan head screws have been included to secure the RLS to the front rack posts.

9. Insert one of the screws through the oblong opening in the front of the RLS cabinet just above the hinge assembly on the left side of the RLS. See Figure 5-15. Use a Phillips screwdriver to thread the screw into the rack post and tighten it securely.

10. Repeat step nine with the remaining pan head screw on the right side of the RLS.

11. Once the library is mounted in the rack, connect all necessary cables.

Front Rack Posts

Hinge
Assembly (2)

Front Panel/Door

Screws to secure the RLS to
the front rack posts.
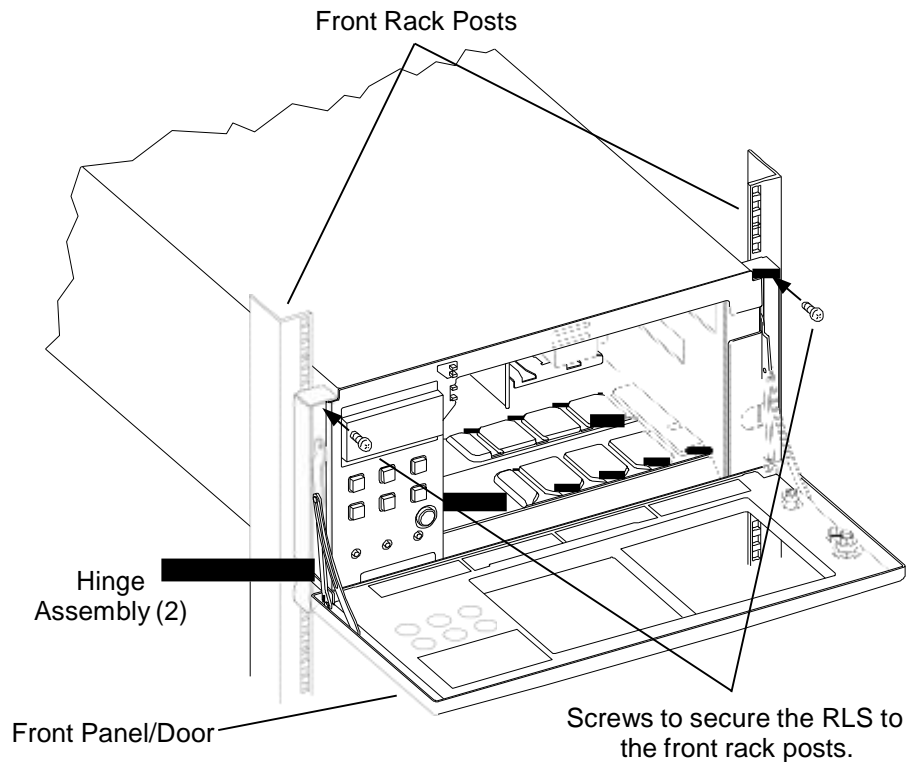
Figure 5-15   Detail of the Screws Securing the RLS to the Front Rack Posts

5.8.4   Rack Mounting RLS-8204, 8204D, 8244, 8244D and 8444H Libraries

Note that some racks will require that the slide assemblies long brackets be attached to the rear side of the rear rack posts in order to mount the RLS. See Section 5.8.4.4 for details.

5.8.4.1   Required Tools

- No. 2 Philips screwdriver
- Standard blade screwdriver
- Tape Measure

5.8.4.2 Pull Out the Inner Slide

Pull out the inner slides from the slide assembles.

1. Place a slide assembly on a flat surface with the back of the slide assembly facing up. Pull out the inner slide from one of the slide assembly as far as it will go. The slide can be extended until the locking arm on the back of the slide emerges. Refer to Figure 5-16.
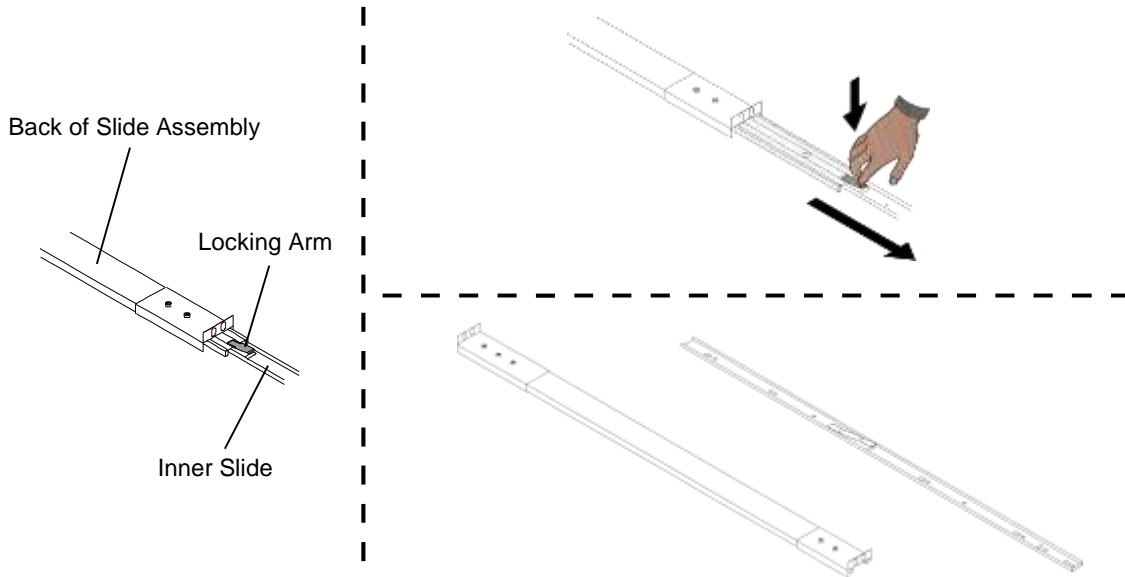
Figure 5-16 Removing the Inner Slide from the Slide Assembly

2. Press the locking arm to release the lock, and then pull the inner slide all of the way out. Refer to Figure 5-16.

3. Repeat the process with the other slide assembly, pulling out its inner slide.

NOTE

The inner slide will be mounted on the RLS, while the slide assembly will be mounted on the rack.

5.8.4.3 Mounting the Inner Slides on the Library

CAUTION

Using screws longer than the lengths specified below can result in permanent damage to the RLS, its media or tape drive.

1. Use five of the supplied 8-32 x 1/4-inch Phillips head screws to mount an inner slide on the library as shown in Figure 5-17. Make sure that the open end of the inner slide is towards the rear of the library.

2. Mount the other inner slide on the other side of the library in the same fashion.

Open End of Inner Slide

5 8-32 x 1/4-inch Screws
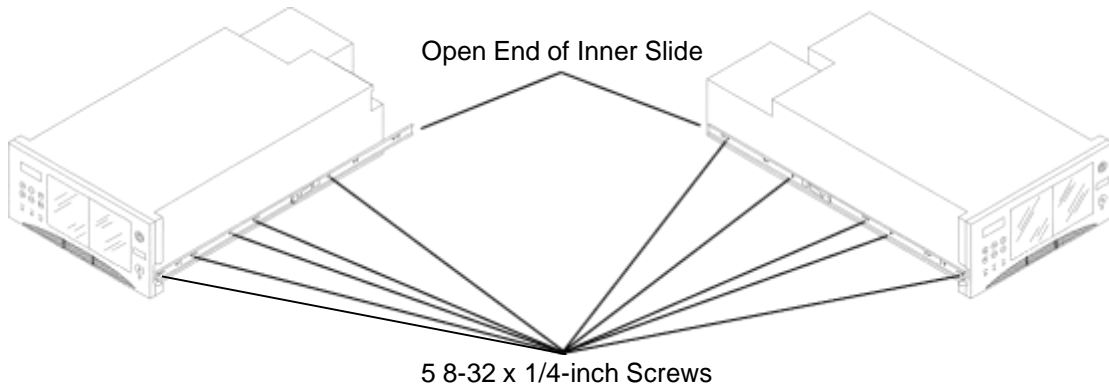
Figure 5-17   Inner Slide Mounted on the Side of the Library

5.8.4.4   Preparing the Rack

Each slide assembly has both a long and short mounting bracket attached to it that needs to be adjusted to match the distance between the front and rear rack posts.

The distance between the front and rear rack posts must be measured to determine if the long mounting brackets will be attached to the inside or outside of the rear posts. Using a tape measure, determine the length from the front to the rear rack post as shown in Figure 5-18. If the distance is 31-inches (78.7 cm) or greater, follow the instructions in Section 5.8.4.5 for mounting the slide assemblies on an "A" style rack. If the distance is 31-inches (78.7 cm) or less, follow the instructions in Section 5.8.4.6 for mounting the slide assemblies on a "B" style rack.

31" (78.7 cm) or Longer = "A" Style Rack.

Shorter than 31" (78.7 cm) = "B" Style Rack.

Rear Rack Post
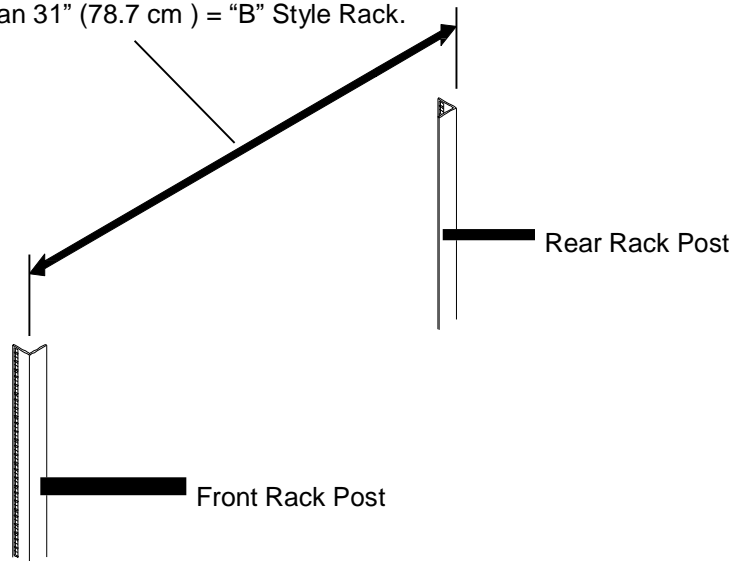
Front Rack Post

Figure 5-18   Measure the Distance Between the Front and Rear Rack Posts

5.8.4.5 Mounting the Slide Assemblies on an "A" Style Rack

1. Decide where the slide assemblies are to be mounted. We recommend marking the position where each slide assembly bracket is to be mounted.

2. Position a slide assembly between the front and rear rack posts to determine how far the brackets need to be moved so that the mounting holes of the brackets will be in contact with the outside edge of the rack posts. Note that the long bracket must be mounted at the rear of the rack. Refer to Figure 5-19.
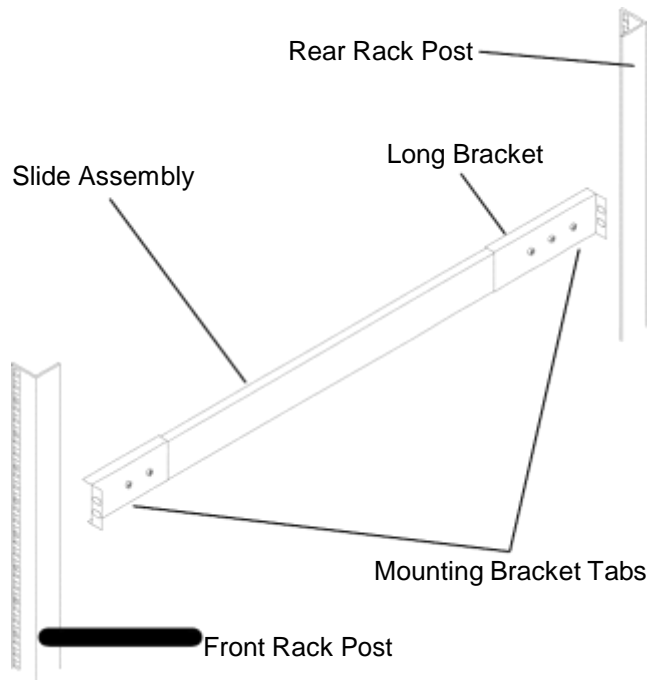
Figure 5-19   Slide Assembly Between the Front and Rear Rack Posts

3. Each slide assembly bracket has screws that are used to position the brackets. To move a bracket, use a standard blade screwdriver to remove the two or three screws. Next, slide the bracket and then reinstall the screws into the threaded holes in the bracket. Be sure that each bracket has all of the required screws used to attach it to the slide assembly.
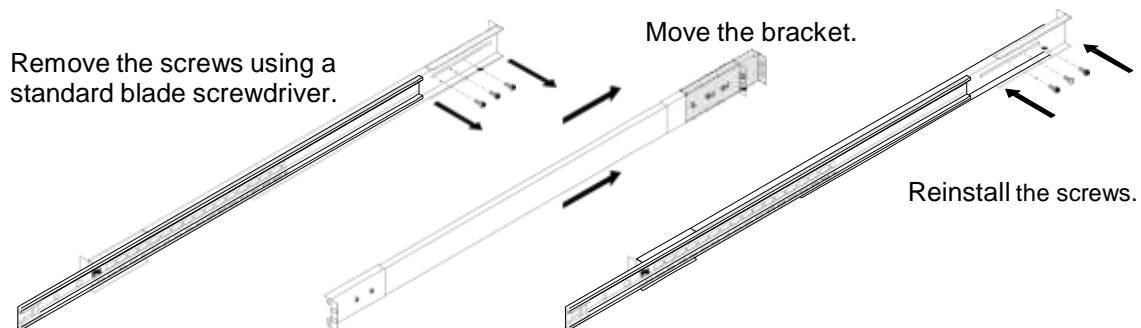
Figure 5-20   Adjusting the Location of the Slide Assembly Brackets

4. When one slide assembly has had its brackets moved so that they are in contact with the outside edge of the rack posts, reposition the brackets on the other slide assembly to match.

5. Position a slide assembly between the front and rear slides so that the brackets are touching the outside of the rack posts and the holes in its brackets align with the mounting positions chosen in Step 1. Make sure that the mounting bracket tabs are facing towards the outside of the rack and that the long bracket is at the rear of the rack. Refer to Figure 5-21.

6. Using the hardware that was supplied with the rack, attach the slide assembly to the rack using all four mounting bracket holes on each slide assembly. Tighten the hardware securely.

7. Using a standard blade screwdriver, tighten all of the screws that were loosened in Step 3 when the brackets were moved on the slide assembly.

8. Repeat Steps 5 through 7 to attach the remaining slide assembly to the rack.
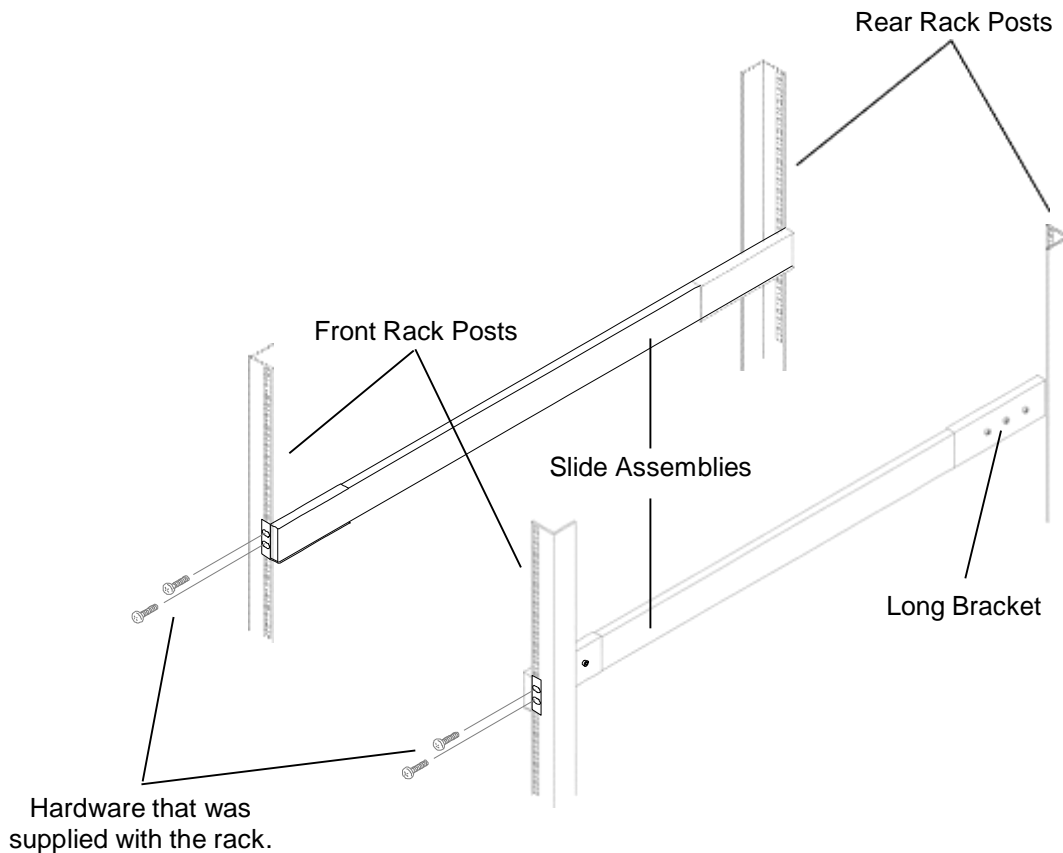
Figure 5-21   Slide Assemblies Being Attached to the Front and Rear Rack Posts

9. Continue to Section 5.8.4.7 "Mounting the Library in the Rack".

5.8.4.6 Mounting the Slide Assemblies on a "B" Style Rack

Racks that measure less than 31-inches (78.7 cm) between the front and rear rack posts require that the slide assemblies long brackets be flipped and attached to the rear side of the rear rack posts in order to mount the RLS.

1. Decide where the slide assemblies are to be mounted. We recommend marking the position where each slide assembly bracket is to be mounted.

2. Each slide assembly long bracket has three screws that are used to secure the bracket. Use a standard blade screwdriver to remove the screws and then slide the bracket off the slide assembly. Refer to Figure 5-22. Repeat for the remaining slide assembly.

Remove the bracket.

Remove the screws using a standard blade screwdriver.
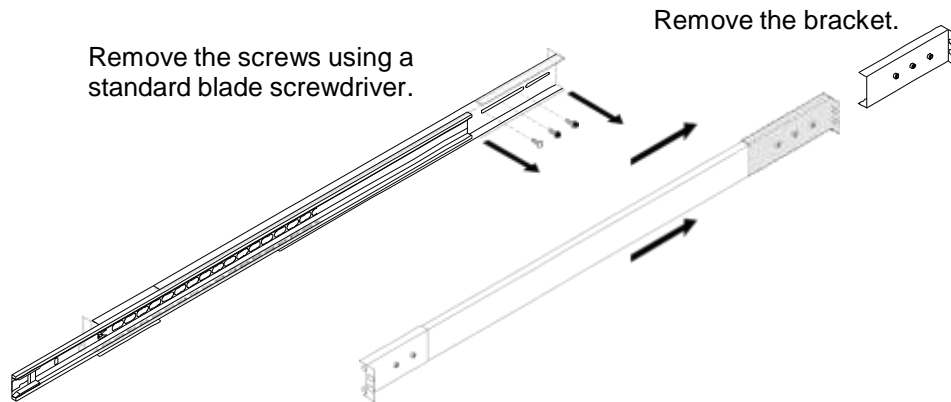
Figure 5-22   Removing the Long Bracket from the Slide Assembly

3. Using the hardware that was supplied with the rack, attach one of the long brackets to the rear side of a rear rack post as shown in Figure 5-23. Repeat for the remaining bracket.

Long Brackets

Hardware that was supplied with the rack.
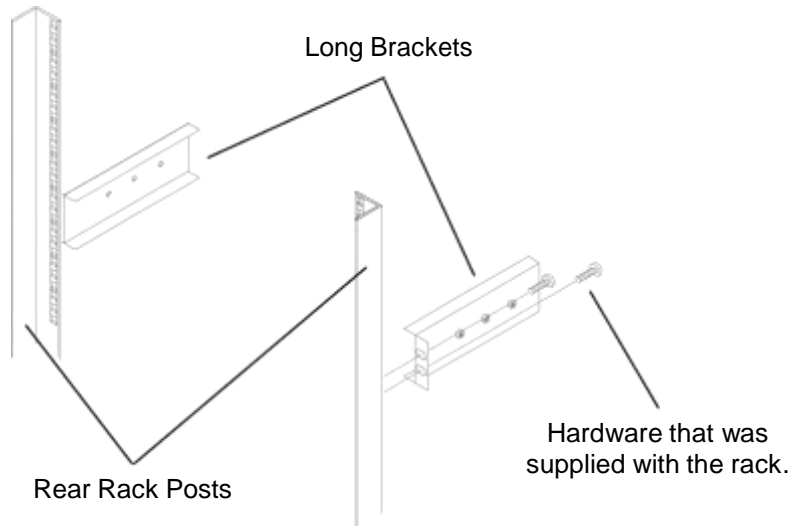
Rear Rack Posts

Figure 5-23   Attaching the Long Brackets to the Rear Rack Posts

4. Position a slide assembly so that the short mounting bracket is touching the outside of the front rack posts and the holes in its bracket align with the mounting position chosen in step 1. Make sure that the mounting bracket tabs are facing towards the outside of the rack and using the hardware that was supplied with the rack, attach the slide assembly to the rail. Repeat for the remaining slide assembly. See Figure 5-24.

5. Using the three screws that were removed in step 2 attach a slide assembly to a long bracket. Note that the screws in the small bracket may need to be loosened to adjust the location of the slide assembly. Repeat for the remaining slide assembly.

6. Using a standard blade screwdriver, tighten all ten of the screws that secure the slide assemblies to the brackets.
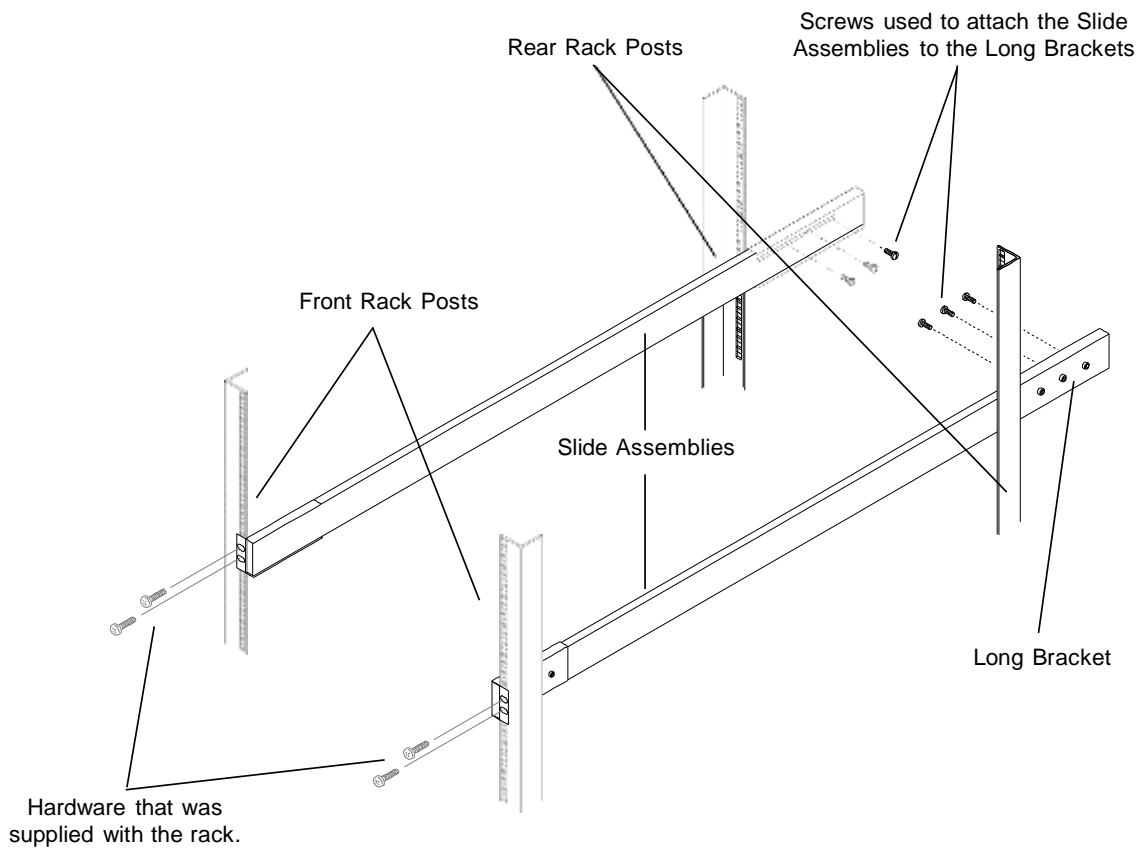
Figure 5-24 Slide Assemblies Being Attached to the Front Rack Posts and Long Brackets

7. Continue to Section 5.8.4.7 "Mounting the Library in the Rack".

5.8.4.7 Mounting the Library in the Rack

DANGER

THE RLS WEIGHS UP TO 150 LBS (68 KG) AND TWO PEOPLE ARE NEEDED TO LIFT IT. HANDLING THE RLS ALONE COULD RESULT IN BACK INJURY OR OTHER ACCIDENTS.

1. Remove any rubber feet that may be attached to the bottom of the RLS.

2. Pull the straight slides out from the slide assemblies. Refer to Figure 5-25.

3. Have two or more people lift the library, fit the inner slides into the straight slide portion of the slide assemblies, and then slide the inner slides to the locking arm positions. The library will not slide past the locking arm positions. Refer to Figure 5-26.

4. Press the locking arms on both slide assemblies to release the locks, and then slide the library all the way into the rack. Refer to Figure 5-27.

Slide Assembly
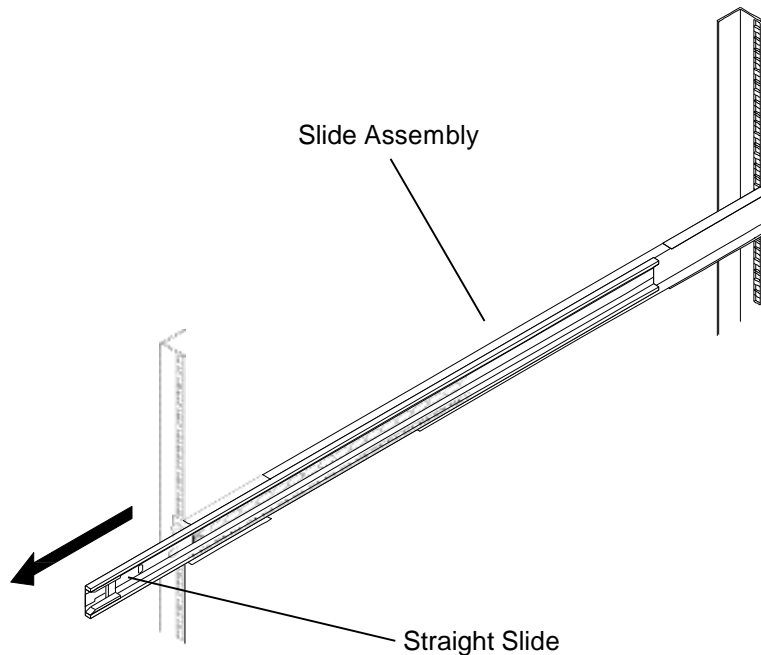
Straight Slide

Figure 5-25   Straight Slide Extended from the Slide Assembly
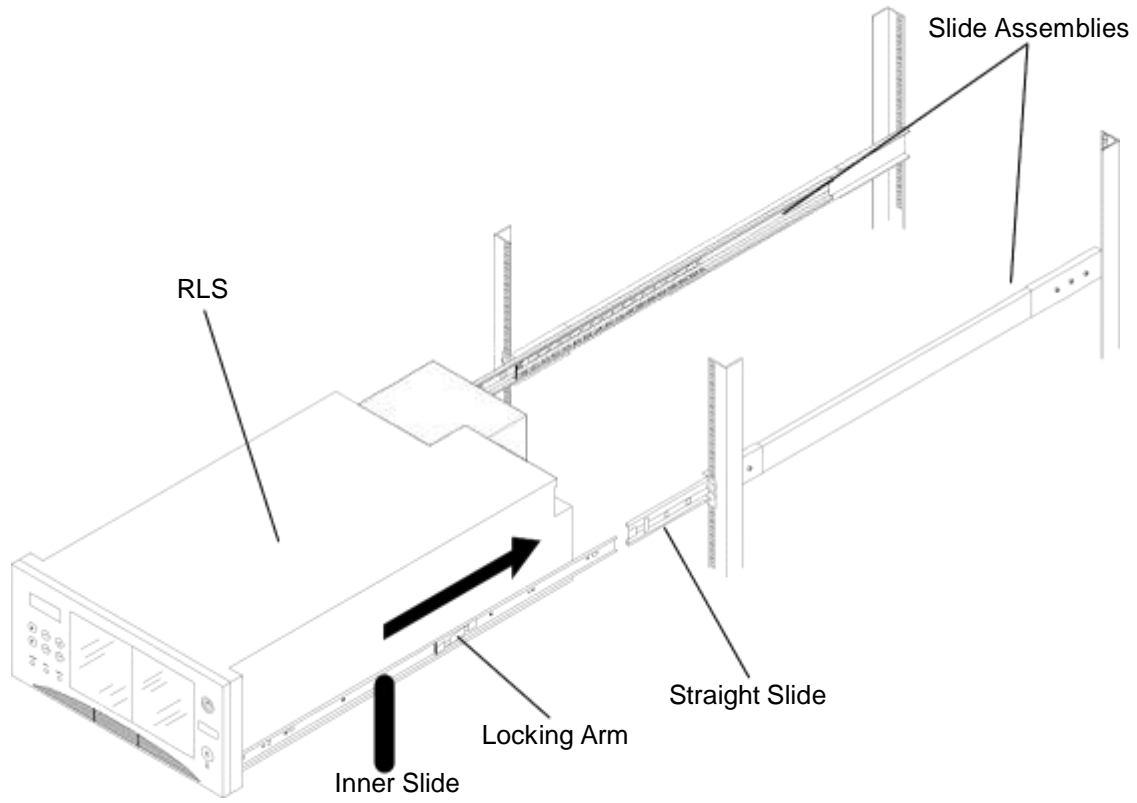
Figure 5-26   Library in Position to be Attached to the Slide Assemblies

Locking Arm

Press here on the Locking Arm to release the lock.
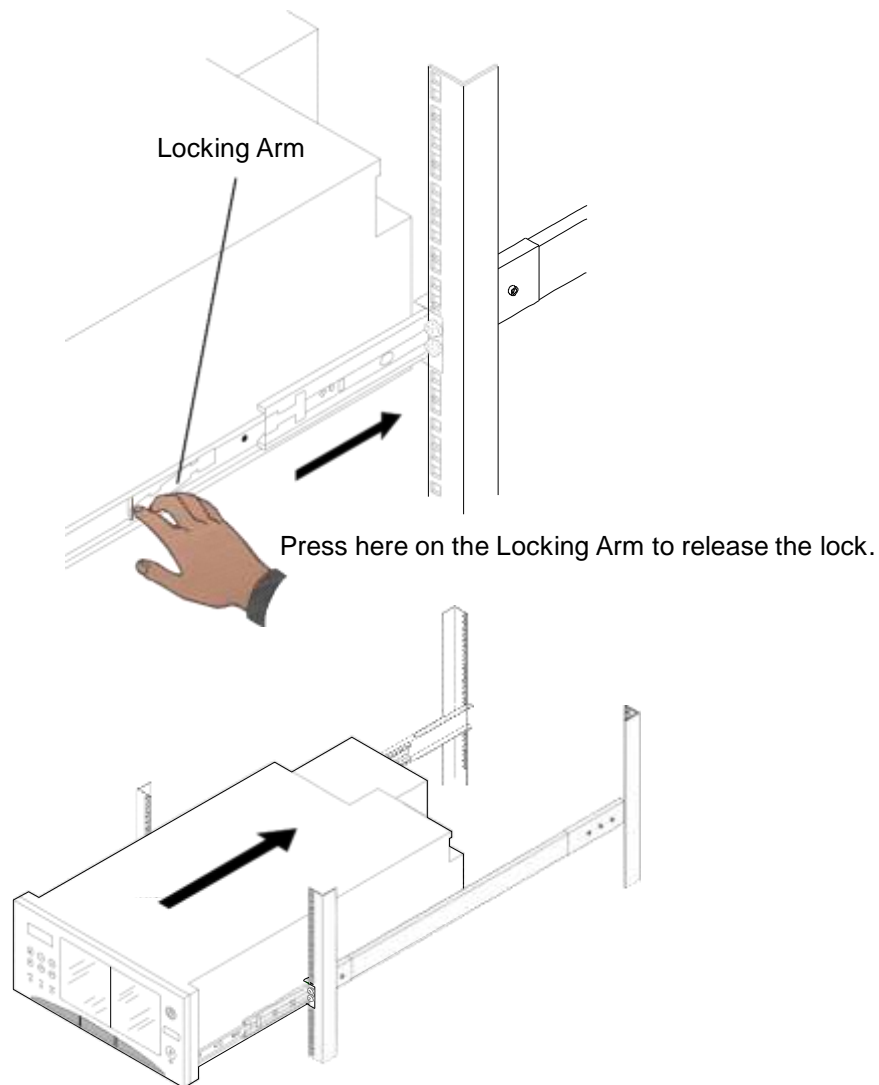
Figure 5-27 Detail of Locking Arm When Installing Library

5. Attach the power cord to the RLS and the mains supply.

6. Press the power switch in the lower right corner of the front panel. The RLS will then perform its Power-On Self Test.

7. Open the front panel as described in Section 5.3.

8. Confirm that the library is housed properly in the rack.

NOTE

Two 10-32 x 1/2-inch pan head screws have been included to secure the RLS to the front rack posts.

9. Insert one of the screws through the oblong opening in the front of the RLS cabinet just above the hinge assembly on the left side of the RLS. See Figure 5-28. Use a Phillips screwdriver to thread the screw into the rack post and tighten it securely.

10. Repeat step eight with the remaining pan head screw on the right side of the RLS.

11. Once the library is mounted in the rack, connect all necessary cables.

Front Rack Posts

Hinge Assembly (2)

Front Panel/Door

Screws to secure the RLS to the front rack posts.
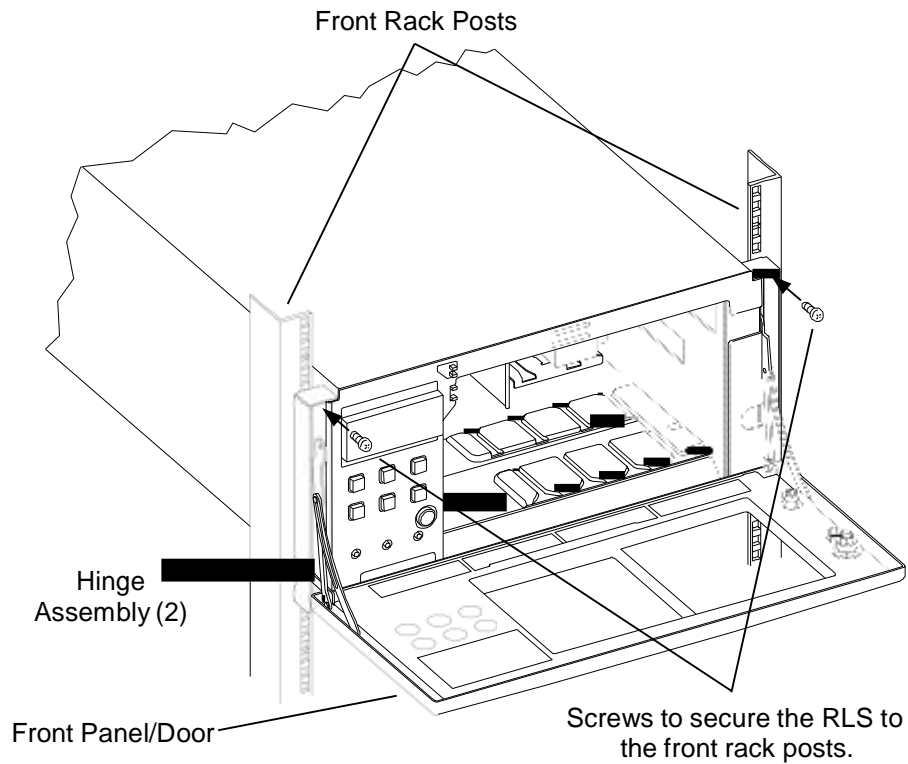
Figure 5-28   Detail of the Screws Securing the RLS to the Front Rack Posts

5.8.5   Removing the Library from the Rack

DANGER

> **THE RLS WEIGHS UP TO 150 LBS (68 KG) AND TWO PEOPLE ARE NEEDED TO LIFT IT. HANDLING THE RLS ALONE COULD RESULT IN BACK INJURY OR OTHER ACCIDENTS.**

1.   Open the front panel/door as described in Section 5.3.

2.   Use a Phillips screwdriver to remove the pan head screws located on the left and right sides of the front of the RLS just above the hinge assemblies. See Figure 5-15.

3.   Close the front panel/door.

4.   Press the power switch on the front panel/door to turn the library off.

5.   Disconnect the power cord and all of the cables attached to the rear of the library.

6.   Pull the library out from the rack until the locking arm positions are reached. The library will not slide past the locking arm positions.

7.   Press the locking arms on both slide assemblies to release the locks, and then slide the library all the way out of the rack. Refer to Figure 5-29.
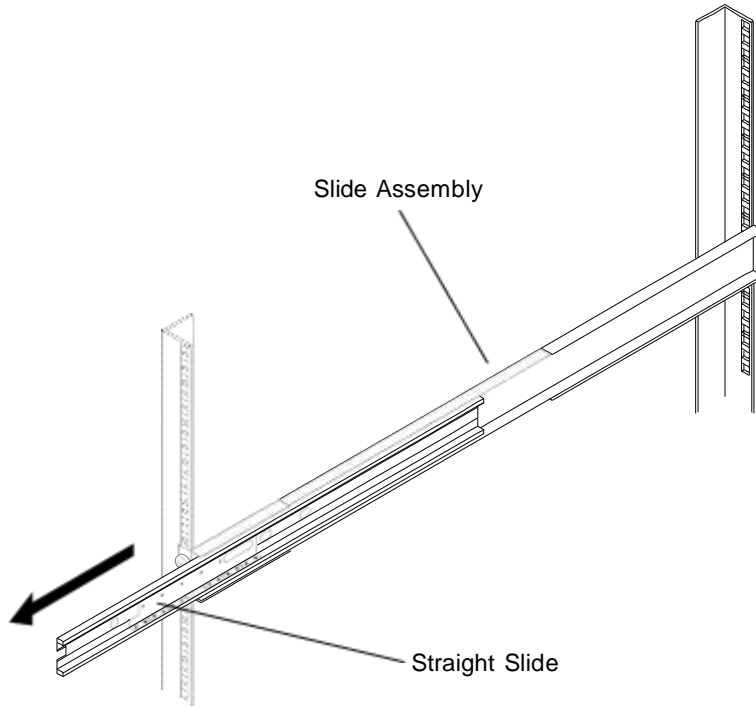
Locking Arm

Press here on the Locking Arm to release the lock.

Slide Assemblies
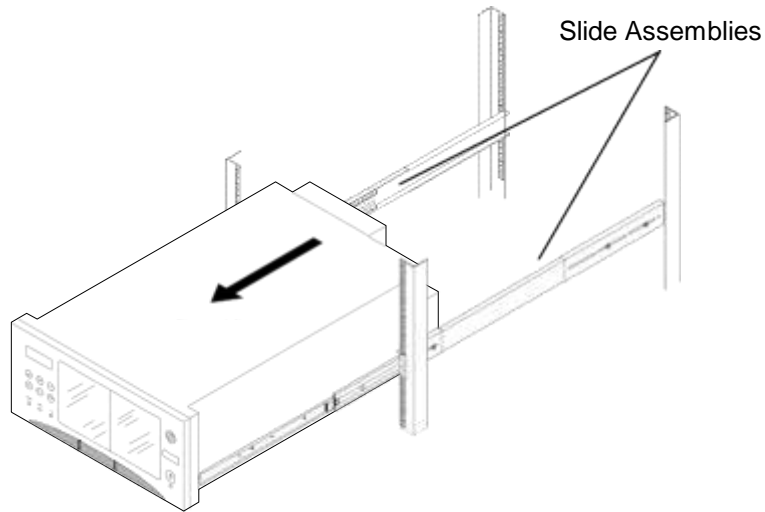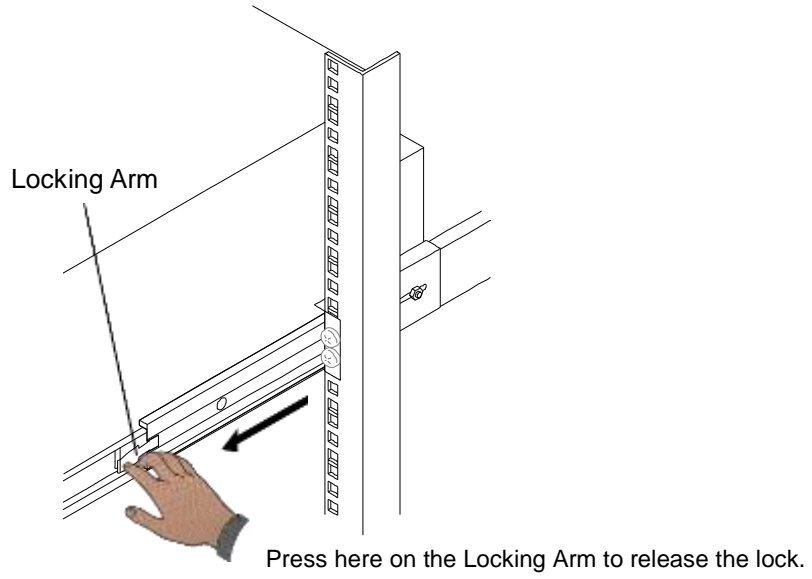
Figure 5-29   Detail of Locking Arm When Removing Library

5.9   SCSI Interface

For clarity and compliance with the SCSI specification, the library control interface of the RLS is defined as a "Medium-changer" and alternately referred to throughout this manual as the "changer".

The standard SCSI control-interface to the MC is both Low Voltage Differential (LVD) and Single-Ended (SE) capable. This is defined as Multimode Single-Ended/Low Voltage Differential or MSE and is called LVD/SE in the vernacular. The pair of SCSI connectors to the Medium-changer are found on the Interface Personality Module (IPM).

Tape drives are available with any of these SCSI interface types in addition to DFA (direct fibre attach) in the RLS-8204D, 8236D, 8244D, 8404D and 8444D models. All devices on a single SCSI bus must be compatible with each other as indicated in Table 5-1 below. Wide (16-bit) and narrow (8-bit) devices may always be mixed together on the same bus.

The RLS presents a pair of SCSI connectors for the Medium-changer and each installed SCSI tape drive. Each of these devices may be connected to separate SCSI busses, they may all be daisy-chained together, or any other combination is possible.

INTERFACE TYPE	BUS COMPATIBILITY
LVD	May not be mixed with HVD or SE.

Table 5-1   SCSI Interface Compatibility

It is imperative that the installer determines the maximum bus speeds of the devices on the bus and then limits the external cable length as indicated in Table 5-3. Furthermore, the type of cable and terminators used must be suitable for the intended configuration (details follow in this chapter).

The RLS Medium-changer and supported SCSI tape drives have the following SCSI capabilities:

Drive Technology	Bus Speeds Supported
RLS Medium-changer	Fast-5, (Fast-80 tolerant)
LTO 1	Fast-5, Fast-10, Fast-20, Fast-40, Fast-80
LTO 2	Fast-5, Fast-10, Fast-20, Fast-40, Fast-80, Fast-160
LTO 3	Fast-5, Fast-10, Fast-20, Fast-40, Fast-80, Fast-160
LTO 4	Fast-5, Fast-10, Fast-20, Fast-40, Fast-80, Fast-160

Table 5-2 LVD/SE SCSI Drive Technology and SCSI Bus Speeds within the RLS

Transfer rates between devices becomes an important consideration for Single-Ended installations. These facts should help in determining and controlling the bus speeds. The initiator and target negotiate their transfer rate based upon their capability without regard to the cables between them or the other devices on the bus. The slower device determines the transfer rate between the two. Each device on the bus negotiates separately and can therefore operate at different rates than its peers.

Should the cabling in an installation not meet the criteria specified in this chapter or the SCSI specifications, the host adapter board may provide a means of limiting the bus speed for each target device. If this becomes necessary, then every target device (MC and tape drives) on the same bus should be limited to a speed as determined by the total cable length.

The SCSI specifications set limits for cable lengths in order to assure reliable performance.

SCSI Type	Max. Devices	Max Bus Length
LVD	16	12 meters
LVD	2	25 meters
SE Fast-20	4	3 meters
SE Fast-20	8	1.5 meters

Table 5-3 SCSI Cable Length Restrictions

The RLS Medium-changer has an internal loop length of 0.4 meters while the standard passive Drive Interface Adapter (DIA) is 0.6 meters per drive. Buffered DIAs have an internal loop length of only 0.1 meters per drive. These lengths plus the lengths of all other cables and devices must add up to less than the limits specified in Table 5-3.

5.9.1   External Cable Requirements

The SCSI specifications require higher performance external cables to facilitate the faster data transfer rates. The following is a brief cable specification for purchasing purposes:

1.   The cable is to meet the requirements of American National Standard for SCSI Parallel Interface-3 Specification. This document is also known as the Working Draft American National Standard T10 Project 1302D.

2.   The cable is a 68-contact alternative 3 shielded mating P cable. The cable is intended for use with all device speeds up to FAST 80 DT.

3.   The cable material used shall meet the requirements for bus speed.

4.   The connectors used shall meet the requirements of the 68-contact alternative 3 mating connector (P cable).

5.   The cable and connectors shall be wired according to 1302D.

5.9.2   SCSI Connectors

The standard RLS SCSI interface utilizes dual-stacked HD68 SPI-3 connectors. The optional 2-gigabit Fibre Channel Bridge Interface Personality Module, instead utilizes dual-stacked Very High Density Cable Interconnect (VHDCI) connectors. The standard HD68 connectors are still utilized by SCSI tape drives.

5.9.3   SCSI Terminators

The SCSI bus must be properly terminated at each of its ends. The host adapter board is usually one terminus. The other end usually appears at the library and requires the installation of a SCSI terminator at the furthest connector from the host. There must never be more than two SCSI terminators on a single bus. Single-ended passive terminators, including regulated passive terminators are not recommended. The recommended LVD/SE SCSI terminator is Qualstar's P/N 117-0011-9.

5.9.4   SCSI Termination Power

The RLS has an electronically switched sources of SCSI termination power that can supply up to 2 amps to the SCSI busses connected to the Medium-changer or any installed SCSI tape drive. Because the RLS drive carrier supplies SCSI termination power for its tape drive, the actual drives are normally installed with their termination power turned off. It is recommended that termination power be enabled only where a SCSI terminator is connected. Enabling all possible sources of SCSI termination power could result in excessively large electrical currents that could cause serious damage in the case of an accidental short-circuit on the SCSI bus.

The Medium-changer SCSI termination power switch is found in the
`Configuration\Advanced\SCSI` menu. Tape drive SCSI termination power
switches are found in the `Configuration\Drive` menus.

5.9.5   Cable Connection Examples

It is possible to connect the Medium-changer and tape drives to the same SCSI bus,
different SCSI busses, or to some combination of SCSI busses. The following figures
some of the possible connection schemes. Figure 5-31 shows an example of connections
for the RLS-8204D, 8216D, 8236CD, 8236D and 8244D DFA tape drives.
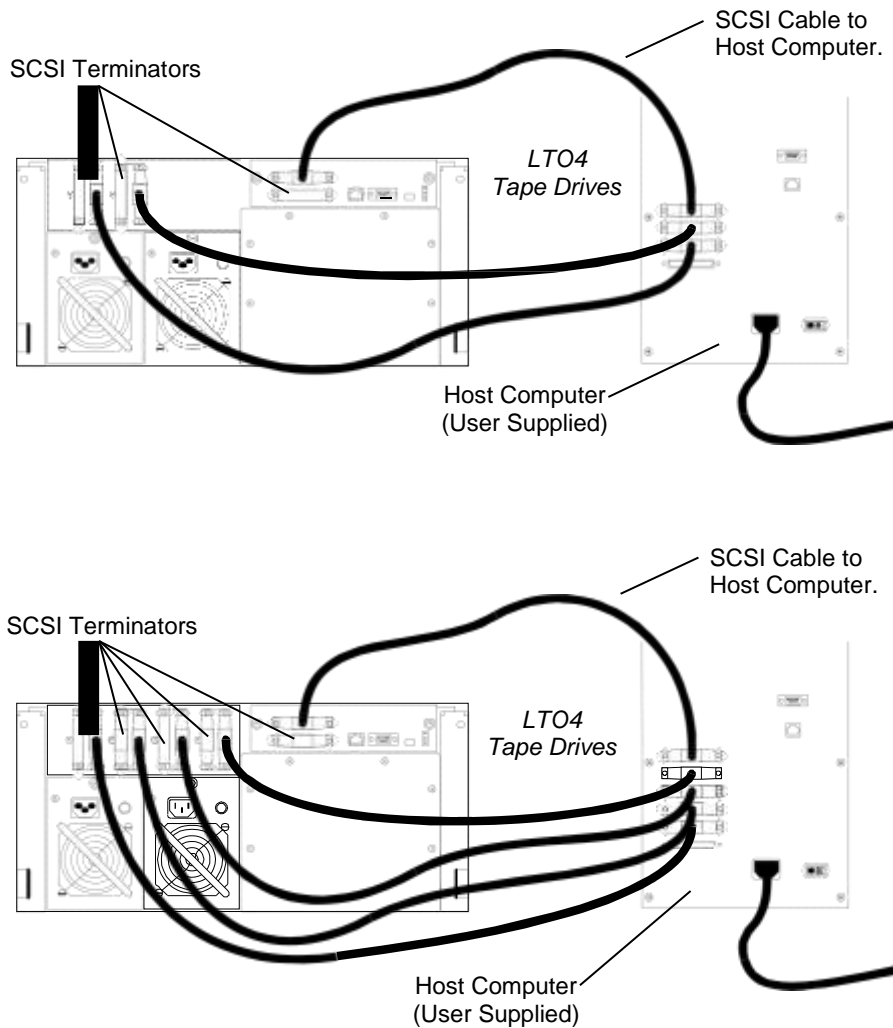
Figure 5-30   SCSI Connection Examples for RLS-82xx and 84xx Models

Fibre Channel Cables
to Switch or Host

SCSI Cable to
Host Computer.

LTO DFA
Tape Drives

SCSI Terminator

Host Computer
(User Supplied)

Fibre Channel Cables
to Switch or Host

SCSI Cable to
Host Computer.

LTO DFA
Tape Drives

SCSI Terminator

Host Computer
(User Supplied)
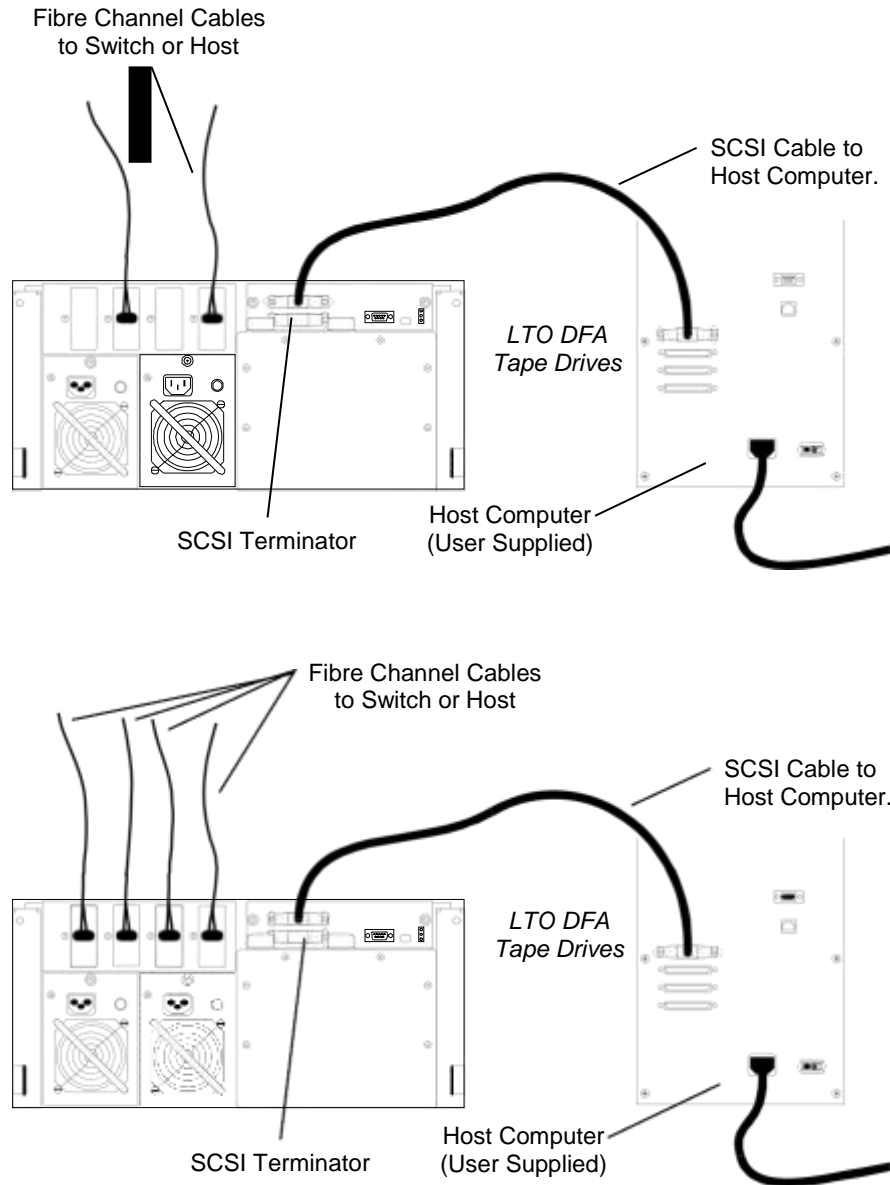
Figure 5-31   DFA Connection Examples for RLS-82xxD and 84xxD Models
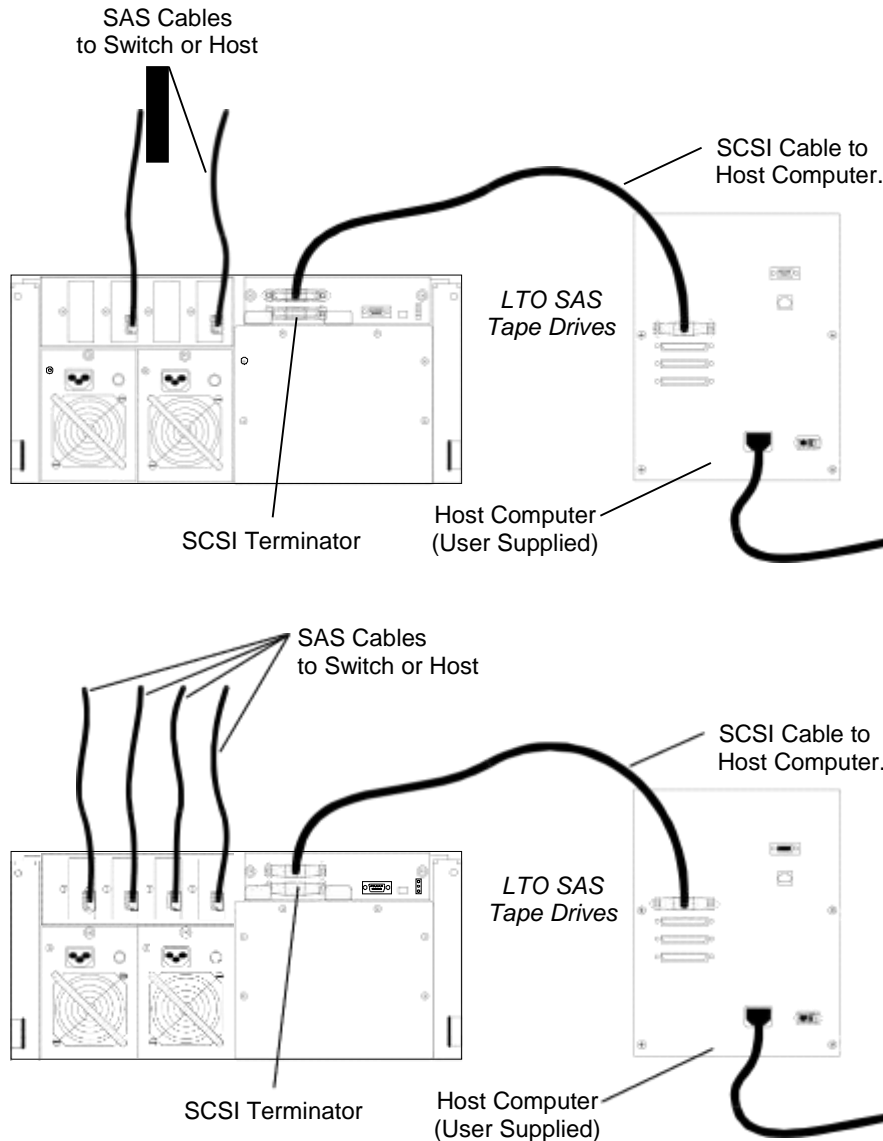
Figure 5-32   SAS Connection Examples for RLS-82xx and 84xx Models

5.9.5.1   ADI (Automation Drive Interface) Connection Examples

RLS Series libraries that have the simplified "ADI" interface eliminate the separate SCSI or Fibre Channel interface to the robotic Medium Changer. The ADI IPM (Qualstar P/N 501567-03-6) does not provide a separate connection to the medium changer. Medium changer control is transferred via the interface to Drive T1, or via the first drive in a partition.

You need only connect to the SAS or Fibre Channel drives.

For SAS, Qualstar and the drive manufacturer, IBM, recommends a 6Gb HBA with external SFF-8088 SAS connection(s). Each external connector can fan out to up to

four (4) drives. Port expanders are not recommended. The maximum length for SAS cables is 8 meters. Cable considerations are in the attached document, Product Information Note # 46 (PIN-046 is available at www.qualstar.com). Also, make sure the BIOS, firmware and driver are current for the SAS HBA.

For Fibre Channel, connect an FC cable from your FC switch to each drive. For small configurations, the drives may be direct-connected to a Fibre Channel HBA, with one port on the HBA for each drive. In the direct-connect scenario, if the drive fails to negotiate with the HBA, please unplug one end of the FC cable and re-connect. Note that LTO 5 drives have an 8Gb FC interface, which will negotiate 2Gb and 4Gb, but not 1Gb.

Fibre Cables
to Switch or Host

LTO FC
Tape Drives

SAS Cables
to Switch or Host

LTO SAS
Tape Drives
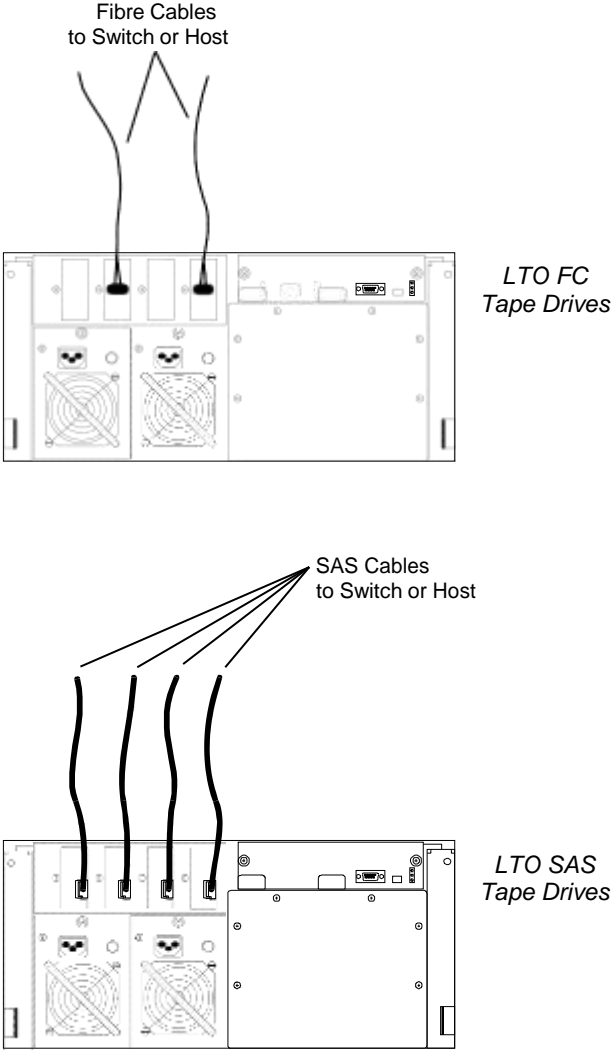
Figure 5-33   ADI Connection Examples for RLS-82xx and 84xx Models

5.9.6   SCSI ID Settings

The default settings for the RLS and tape drives are as follows:

Device	Default ID
Medium-changer	0
Tape Drive T1	1
Tape Drive T2	2
Tape Drive T3	3
Tape Drive T4	4

Table 5-4   Default SCSI ID's (T3 and T4 found only on RLS-84xx models)

The SCSI ID of the host adapter card in the host computer is normally set to 7. The SCSI ID of any of the devices in Table 5-4 may be changed to any value from 0 to 15. They may all be set to the same value as long as they don't reside on the same SCSI bus. Remember that a SCSI ID can only be used by a single device on a SCSI bus.

The SCSI ID of the Medium-changer is determined by the `Configuration\SCSI ID` value while the tape drive ID's are selected in the `Configuration\Drive T? menus`. Tape drive SCSI IDs are only set when their power is applied. Therefore, it is necessary to cycle the RLS power on and off to actually change the drive's SCSI ID.

NOTICE

Changing the SCSI ID of a tape drive via the menu system causes the RLS to change the state of signals connected to the tape drive. However, the tape drive only checks these signals when power is applied or following a SCSI bus reset. Therefore, the SCSI ID's of the tape drives will not immediately change after setting them.

To cycle the power of an individual tape drive, execute the `POWER CYCLE` command in the `Configuration\Drive\T?` menu. This will allow the drive to change to its new SCSI ID.

The host computer should be booted at this time to check that it can find the RLS Medium-changer and all of the installed tape drives.

5.9.7   Checking the RLS SCSI Configuration

At this point, the tape drives, magazines and cartridges have been installed, and the SCSI cables have been connected. Also, the RLS power has been turned on where needed and the Medium-changer has proven to be basically functional (successful completion of the power-up sequence). The Medium-changer is now configured to the default values for use with the drives and with the host computers.

5.9.8 Testing Basic SCSI Operation

The MC, can now be tested to verify that it responds correctly to commands from the host. The simplest way of doing this is to issue a Test Unit Ready command to the MC. If the changer returns a GOOD status, then it is certain that the SCSI communications protocol and SCSI cable (and associated line drivers and receivers) are operational. Once the Media-changer returns a GOOD status, the system is ready for a more thorough checkout.

The factory-default settings are sufficient for 90% of the SCSI applications in the field. This means that in nine out of ten installations, the system will transfer data and function normally. Some systems, however, may not function optimally using the factory-default settings. For example, the application may require a particular SCSI Inquiry string, which differs from the default inquiry string. Refer to Chapter 8 for additional information on configuring the RLS. The default inquiry strings are:

- "RLS-8202-12"
- "RLS-8202-20"
- "RLS-8202-28"
- "RLS-8202-36"
- "RLS-8202D-12"
- "RLS-8202D-20"
- "RLS-8202D-28"
- "RLS-8202D-36"
- "RLS-8204-12"
- "RLS-8204-20"
- "RLS-8204-28"
- "RLS-8204-36"
- "RLS-8204-44"
- "RLS-8204D-12"
- "RLS-8204D-20"
- "RLS-8204D-28"
- "RLS-8204D-36"
- "RLS-8204D-44"
- "RLS-8216C"
- "RLS-8216CD"
- "RLS-8236C"
- "RLS-8236CD"
- "RLS-8236"
- "RLS-8236D"

- "RLS-8244"
- "RLS-8244D"
- "RLS-8444"
- "RLS-8444D"

6.   The Operator Interface

The Control Panel shown in Figure 6-1 is used to configure and control the library system. It can also be used to add or remove cartridges. These manual cartridge movement commands can be locked out to prevent inventory tampering. An audible alarm is also provided behind the panel.

Control and configuration access is accomplished through a hierarchical menu system. The top of this structure is called the Top Menu. An explanation of the menu hierarchy follows in Section 6.7.
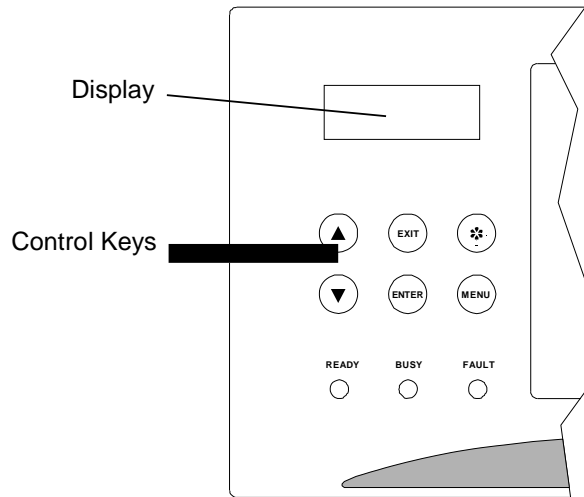
Figure 6-1   RLS Control Panel

6.1   Display

The illuminated liquid crystal display provides information about the RLS. It also displays alert and error information, and is used to set various operating parameters. The display's contrast can be controlled from the menu system.

The display contains four lines of twenty characters each. In the normal operating mode, it displays the information shown in Figure 6-2.

Line 1: Manufacturer and Model Number
Line 2: Blank
Line 3: Changer's Current Status (dynamic)
Line 4: Message provided by the host computer
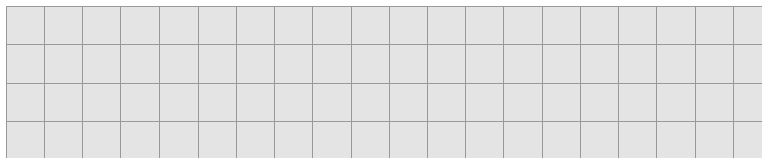
Figure 6-2   The Operating Display

6.2   The Door Lock

The Door lock is used to secure the RLS inventory and menu system. When in the locked position, the front panel/door cannot be opened under any conditions. When in the unlocked position, the front panel/door can be opened if the RLS has not received a Prevent Media Removal command from a host computer. The key can be removed from the door lock in either position.

The Door lock is an integral part of the menu security system. See Section 8.1 for details.
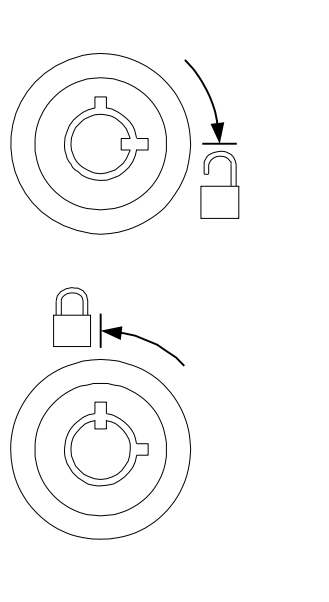
Figure 6-3   Door Lock Positions

6.3   Control Keys

The six control keys make it possible to point to a particular item and change or edit its value, or to execute a command. The function of each control key is dependent upon the location within the menu structure. The control keys are shown in Figure 6-4.
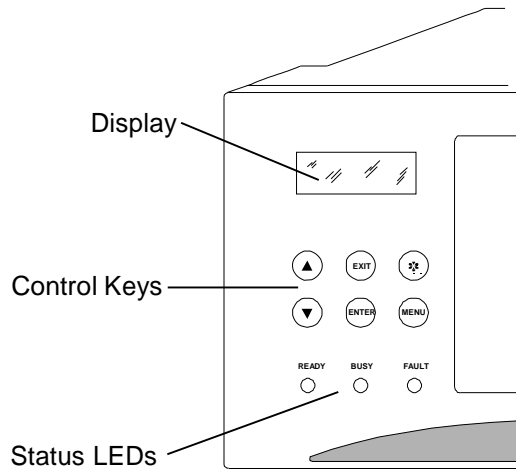
Figure 6-4 RLS Control Panel

6.3.1   The MENU Control Key

Press the MENU key to enable the menu system. The menu system can be used
without interrupting ongoing changer operations. If the Top Menu is not displayed,
pressing the MENU key at any time always returns control to the Top Menu (Figure
6-5). If the Top Menu is displayed, press the MENU or EXIT key to return to the
Operating Display.

6.3.2   The Ⅴ (UP) and Ⅶ (DOWN) Control Keys

- While navigating through the menu system, the Ⅴ (UP) and Ⅶ (DOWN) keys move
  the item pointer (right-pointing arrow) up and down the left column of the display.
  The display automatically scrolls when necessary. The pointer identifies the current
  selection, as shown in Section 6.3.3.

- If a value is highlighted, the Ⅴ (UP) and Ⅶ (DOWN) keys change the value of the
  highlighted character or word. When these keys are held down, their action repeats
  at a rapid rate.

6.3.3   The ENTER Control Key

The ENTER key behaves as follows:

- If the item pointer is pointing at a sub-menu (indicated by a leading bullet),
  pressing ENTER will display the selected sub-menu.

```
O•••••Element Status
≪•Display
 •Find Label
 INITIALIZE
    Skip Labels: NO
 INVALIDATE
```

- If the item pointer points to a command such as POSITION (commands are always displayed in all upper case letters), pressing ENTER executes the command.

```
O•••Position Handler
 To Location:llllll
≪POSITION
```

- When a command is executed, only the top line of the menu and the command name (centered on the third line) are displayed for the duration of the command's execution.

```
O•••Position Handler

        POSITION
```

- If a value contains an editable field, pressing ENTER highlights the first character of the field by superimposing a flashing cursor over it. This indicates the Edit mode is active and the value of the highlighted character can now be changed using the V (UP) and W (DOWN) keys.

- In the Edit mode, pressing ENTER moves the cursor one character to the right. If the cursor is over the rightmost character, pressing ENTER moves it back around to the leftmost character. The action repeats if the control key is held down.

- If a value contains a multiple-choice field, pressing ENTER highlights the field by superimposing a flashing cursor over it. Pressing ENTER again has no effect.

6.3.4 The EXIT Control Key

The EXIT key behaves as follows:

While editing a menu item's value, pressing the EXIT key exits the editor and restores the pointer to the menu item. Note that all values changed during editing are actually changed, exiting does not undo those changes. Press the EXIT key, while pointing to any item in a menu, to return to the next higher menu. Press the EXIT key while the Top Menu is displayed to exit the Menu mode and return to the operating display.

6.3.5 The ∼ (Daisy) Key

If the menu system is closed, pressing the ∼ (Daisy) key will open the Quick Operation menu. Press the MENU key twice to close the menu system.

6.4   Quick Operation Menu

The `Quick Operation` Menu is opened by pressing the ~ (Daisy) key when the RLS status screen is displayed (cannot be opened while navigating the RLS menu system).

The `Quick Operation` menu contains only commands. This menu is not part of the general menu tree structure. It works differently than the menu system is that it contains only commands and it dismisses itself after executing one of its commands. Simply point to one of the `Quick Operation` commands and press the ENTER key to invoke the command and dismiss the `Quick Operation` menu. You can also exit the menu by pressing the EXIT key.

```
OPEN & PARK LEFT
OPEN & PARK RIGHT
OPEN VIOP
OPEN VIOP n
PARK LEFT
PARK RIGHT
(UN)LOAD LIBRARY
```

6.4.1   OPEN & PARK LEFT Command

NOTE

The OPEN & PARK LEFT command will not appear if the front panel/door is locked by the Door Lock <u>or</u> by a Prevent Media Removal command from a host computer.

The OPEN & PARK LEFT command will unlock the front panel/door and move the carriage to its far left position. This command should be used when accessing the tape drives. After the carriage has stopped, gently pull the front panel/door open.

6.4.2   OPEN & PARK RIGHT Command

NOTE

The OPEN & PARK RIGHT command will not appear if the front panel/door is locked by the Door Lock <u>or</u> by a Prevent Media Removal command from a host computer.

The OPEN & PARK RIGHT command will unlock the front panel/door and move the carriage to its far right position. This command should be used when accessing the carousel or storage array. After the carriage has stopped, gently pull the front panel/door open.

6.4.3   OPEN VIOP (n) Command

NOTE

The OPEN VIOP command will not appear if it is locked by a Prevent Media Removal command from a host computer.

The OPEN VIOP command only appears in the menu when a Variable I/O Port has been configured. If the RLS has been configured for more than one logical library, then the command appears for each logical library (ex. OPEN VIOP a, OPEN VIOP b for an RLS configured for two logical libraries). Invoking this command causes the Carousel or Storage Array to position the VIOP magazine for the selected logical library to the access position. It then opens the VIOP door.

The operator must manually close the VIOP door before the RLS can again execute host commands.

6.4.4   PARK LEFT Command

This command moves the carriage to its far left position. This is useful for observing the tape drives.

6.4.5   PARK RIGHT Command

This command moves the carriage to its far right position.

6.4.6   (UN)LOAD LIBRARY Command

NOTE

The (UN)LOAD LIBRARY command will not appear if it is locked by the Door Lock or by a Prevent Media Removal command from a host computer.

This command unlocks the front panel/door and allows the user to remove or install any number of cartridges in the magazine. The entire magazine may also be removed or replaced. Closing the front panel/door will cause the carousel or storage array to move to the next magazine whereupon the front panel/door is again unlocked. This process continues until all magazines have been presented.

6.4.7   The Status LEDs

The three status LEDs display the current operational status of only the RLS Medium-changer. Only one of them is illuminated at a time and they have the following significance:

NAME	COLOR	INDICATION
READY	GREEN	The RLS is ready to accept commands
BUSY	AMBER	The RLS is busy executing a command
FAULT	RED	A fault has occurred and the RLS cannot accept commands

Table 6-1   Status LEDs Descriptions

6.5   The Top Menu

To see the Top Menu, turn on the RLS, wait until the display shows model number, then press the MENU key. The display should resemble the one in Figure 6-5.

Display line one always indicates the title (or its abbreviation) of the current menu or function.

T	o	p		M	e	n	u												
→	·	C	o	n	f	i	g	u	r	a	t	i	o	n					
	·	M	a	i	n	t	e	n	a	n	c	e							
	·	O	p	e	r	a	t	i	o	n									↓

The **item pointer** to the left of an item indicates which item will be acted upon when the ENTER key is pressed. For example, press ENTER when the arrow points to Configuration and the display will change to the Configuration menu.

A dot in front of an item indicates a sub-menu. To go to the sub-menu, press the ENTER key.

DOWN and UP arrows indicate additional lines are to be seen by scrolling the display with the UP and DOWN key.

Figure 6-5   Top Menu Display

If the arrow is positioned next to Operation and the ENTER key is pressed, a display similar to that shown in Figure 6-6 will be observed.

The up and down arrows at the right edge of the display indicate that additional choices are available. These additional choices can be viewed by using the V (UP) and W (DOWN) keys to scroll the display.

To go back to the Top Menu from any point, press the EXIT key until the Top Menu is displayed. The MENU key can also be pressed to accomplish the same result with a single keystroke. To leave the menu system entirely, press the EXIT or MENU key while the Top Menu is displayed.

Display line one gives the title of the current menu or function, The RLS will always try to spell out menu names as completely as possible in the 20 characters available.

A series of leading dots indicates that the next higher menu is the Top Menu
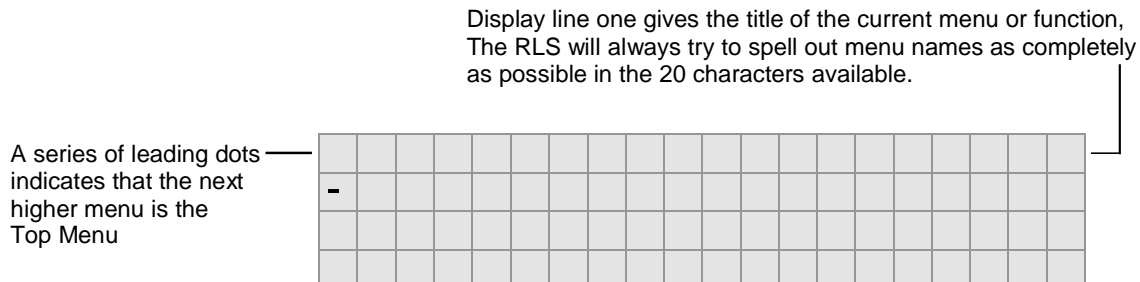
Figure 6-6   The Operation Menu

6.6.1 Menu Items

Line 1 of any menu display always indicates the name of the menu right justified, with the exception of the Top Menu, where menu names are left justified. The name of, or an acronym for, the parent menu will precede the menu name and will be left justified. Bullets fill the space between the two menu names. Examples:

LINE 1 DISPLAY	INTERPRETATION
`Top Menu`	Top Menu
`••••••Configuration`	Configuration Menu
`CA•••••Control Panel`	Configuration\Advanced\Control Panel Menu
`CA•Changer•Labels`	Configuration\Advanced\Changer\Labels Menu
`OES••••••••••Display`	Operation\Element Status\Display Menu

Lines 2 through 4 of any menu display may contain the following items:

Menu Name	A Menu Name is displayed with a single leading bullet and an upper/lower case name. Example: ● `Maintenance`
Command Name	A Command Name is displayed in all upper case letters without a bullet or colon. Example: `SET TO DEFAULTS`
Value Name	A Value Name is displayed with an initial capital letter, a colon after the name, followed by a right-justified value field. Example: `Contrast:    48`
Menu Name and Non-editable Name	The Menu Name, indicated by a single leading bullet and an initial capital letter, is followed by a Non-editable Name. The Menu Name has a sub-menu, as indicated by the leading bullet, containing Non-editable Names. Each Non-editable Name is the name of a parameter set. The parameters in each set are editable. Example: ● `Inq:       Native`

6.6   Menu Elements

6.6.2   Values

The data to the right of the colon after a value name represents the current value of that item. There are several types of values:

6.6.2.1   Numeric Values

These values may contain leading zeros. Some leading zeros are displayed during editing, but are blank up to the first non-zero digit when the menu is exited. Valid values are separately determined for each item and are always within a contiguous range. All numeric values carry and borrow to or from their more significant digits. There are three types of numeric values found within the system:

Unsigned Decimal Values	Examples: 23, 07, 123
Signed Decimal Values	These values are always indicated by the presence of a plus or minus sign in front of the numerical value. The plus or minus signs are editable. Examples: +07, +7, −123
Hexadecimal Values	These values are always unsigned and consist of the digits 0-9 and A-F. Leading zeros are always indicated. Examples: 003F, FE10

6.6.2.2   Alphanumeric Values

These values can contain up to 96 different characters (see Section 6.6.4.4), including ten numerals (0-9), upper and lower case letters and special characters, like spaces, dashes, etc. There is no rollover between digits. Example:

    Qualstar RLS-8202

6.6.2.3   Multiple-Choice Values

Each multiple-choice value has its own list of valid choices. These values are selectable, but not editable. The choices available may vary with different system configurations. Examples:

    YES, NO, BOTH, FRONT, HOST

NOTICE

The values displayed are always the actual values. If a displayed value is changed in the display, it is immediately changed within the system. If it is necessary to change back to an original value, the displayed value must be changed back to the original value.

6.6.3 Location Designators

A Location Designator contains up to six characters used to describe any *physical* location. A "**p**" in the first character signifies a *physical* location with the five remaining characters are defined below. When a character is not required to define a particular location, the character is replaced with a decimal point or dot.

Space	Primary Location	Secondary Location
a–d,p	F,H,IA…IZ,MA…MZ,T	•,1–5

Table 6-2 The *physical* Location Field

Character	Definition
Space	This character is always a lower-case "p" when describing the *physical* space. Characters a–d indicates logical libraries a-d element address space.
Primary Location	F: Fixed Slots H: Handler MA.–MZ: Magazine A through Magazine Z (model dependent) IA–IZ: VIOP Magazine A through VIOP Magazine Z (model dependent) T: Tape Drive
Secondary Location	This digit is used to locate a particular location within a primary group (all are model dependent): Fixed Slots (1–2), Magazine Slot (1–5), Tape Drive (1–4)

Table 6-3 *physical* Character Definitions

Example	Definition
pH....	The Handler
pID1..	The first VIOP storage location: Magazine D, Slot 1 (**must always be slot 1**)
pID5..	The last VIOP storage location: Magazine D, Slot 5 (**must be in same magazine as first slot**)
pMB3..	A magazine storage location: Magazine B, Slot 3
pT1...	The leftmost tape drive
pF1...	The leftmost Fixed location
p.....	An unassigned location

Table 6-4 Location Designator Examples

By changing the Space character from a "p" to an "a", "b", "c" or "d" you can view the SCSI element address (0–65535) of a physical location described in the *physical* space of logical libraries a, b, c, or d.

6.6.4   Editing Values

When changing a displayed value, point to its name using the V (UP) and W (DOWN) keys, then press ENTER. Not all values are editable. If a cursor does not appear over the value when the ENTER key is pressed, then the value cannot be changed. If a cursor appears over the first character only, the value is either numeric, alphanumeric, or a cartridge location. If the cursor appears over the entire value, it is a multiple-choice value.

6.6.4.1   Editing Multiple-Choice Values

If the item contains a multiple-choice value, the entire value will be overlaid with flashing block cursors. Use the V (UP) key to select the next value and the W (DOWN) key to select the previous value and press the EXIT key when done. The list of choices wraps around, so all the choices are visible by using just the V (UP) or W (DOWN) key.

6.6.4.2   Editing non-Multiple-Choice Values

If only the first character of the value is highlighted with a flashing block cursor after pressing the ENTER key, the value is either numerical, alphanumerical, or a cartridge location. These values may be edited one character at a time using the ENTER key to select the character to be edited and then using the V (UP) or W (DOWN) key to change the character's value.

NOTE

The cursor wraps around from the last to the first character. Also, the ENTER, V (UP) or W (DOWN) keys automatically repeat when held down.

6.6.4.3   Editing Numerical Values

Numerical values may be edited one digit at a time or the entire value may be changed by simply incrementing or decrementing the least significant digit (or any intermediate digit). When incrementing the digit 9, it goes to 0 and a carry is added to the more significant digits. The opposite effect occurs for decrementing. This process will automatically stop at the upper and lower limits of the valid range for each item. Remember to take advantage of the automatic key repeat feature by holding down either the V (UP) or the W (DOWN) key.

The RLS will never allow making any value invalid. The choice for each digit is limited to valid values. For example, valid values for SCSI ID's range from 00 to 15. The range of some valid values may change with a system's particular configuration. In this example, if the X1 digit was selected, then the value can be incremented all the way from 00 to 15 and rolling over to 00 again by simply holding down the V (UP) key. Holding the W (DOWN) key will decrement the value to 00 and stop there.

6.6.4.4   Editing Alphanumeric Values

Either the V (UP) or the W (DOWN) keys can be used to edit alphanumeric characters one at a time. There are no carries or borrows to other characters. The choice for each particular character will be limited to valid characters, which vary with the item and the character's position within it.

Table 6-5 shows the available alphanumeric characters (A/N) and their hexadecimal (hex) equivalents. The menu display A/N characters occur in the order shown in the table, starting with the "space" character, followed by the "A" character and ending with the " ` " character. The hexadecimal equivalents are those values sent over the SCSI interface in response to SCSI commands.

A/N	hex	A/N	hex	A/N	hex	A/N	hex	A/N	hex	A/N	hex	A/N	hex	A/N	hex
(space)	20	L	4C	X	58	j	6A	v	76	7	37	*	2A	[	5B
A	41	M	4D	Y	59	k	6B	w	77	8	38	+	2B	¥	5C
B	42	N	4E	Z	5A	l	6C	x	78	9	39	,	2C	]	5D
C	43	O	4F	a	61	m	6D	y	79	!	21	-	2D	^	5E
D	44	P	50	b	62	n	6E	z	7A	"	22	.	2E	_	5F
E	45	Q	51	c	63	o	6F	0	30	#	23	/	2F	{	7B
F	46	R	52	d	64	p	70	1	31	$	24	:	3A	|	7C
G	47	S	53	e	65	q	71	2	32	%	25	;	3B	}	7D
H	48	T	54	f	66	r	72	3	33	&	26	<	3C	→	7E
I	49	U	55	g	67	s	73	4	34	'	27	=	3D	←	7F
J	4A	V	56	h	68	t	74	5	35	(	28	>	3E	@	40
K	4B	W	57	i	69	u	75	6	36	)	29	?	3F	`	60

Table 6-5   Alphanumeric Characters and their "ACSII" Hexadecimal Equivalents.

6.6.4.5   Editing Cartridge Location Values (Designators)

A cartridge location designator can be edited like an alphanumeric value –one character at a time. It can be scrolled from one magazine. Tape drive or fixed slot to the next by incrementing or decrementing the secondary location digit below 1 or above the maximum value. Remembering that holding the V (UP) or the W (DOWN) keys will cause the values to scroll rapidly.

6.7   The Menu Hierarchy

The hierarchical menu system is divided into three menus: Configuration, Maintenance and Operation. Each of these menus contains several sub-menus. Some of the sub-menus may also contain more sub-menus beneath them.

The Top Menu is the highest level in the menu hierarchy. Press the MENU key to go to the top level at any time and from any point within the menu system. When the Top Menu is displayed, press the MENU or EXIT key to exit the menu mode. Figure

6-7 shows the available menu items in the Top Menu. The line items in menus and sub-menus are organized in alphabetical order.

Line 1	T	o	p		M	e	n	u								
Line 2	→	·	C	o	n	f	i	g	u	r	a	t	i	o	n
Line 3		·	M	a	i	n	t	e	n	a	n	c	e			
Line 4		·	O	p	e	r	a	t	i	o	n					

Figure 6-7   Top Menu

The Configuration menu contains items that may need to be changed when the RLS is installed. Once the configuration parameters have been correctly set for a given installation, they are not changed unless something in the system's configuration is changed. The Configuration menu is fully explained in Chapter 8.

NOTE

Be aware that the configuration parameters may also be set by the SCSI interface. An unexpected change may have been caused by the host system.

The Maintenance menu is designed to help a qualified repair technician diagnose and repair the RLS. Its functions are outside the scope of this manual and are fully explained in the RLS-8000 Technical Service Manual (Qualstar document number 501510).

The Operation menu is designed for the user. It allows an operator to perform tasks associated with the operation of the changer. A detailed description of the Operation menu appears in Chapter 9.

6.8   Displaying the RLS Firmware Revision

The revision of the RLS' firmware may be displayed by using the `Maintenance` menu. Press the MENU key to display the `Top Menu`. Press the W (DOWN) key until the arrow on the left side of the display points to `MAINTENANCE`, then press the ENTER key. Again, press the W (DOWN) key until the arrow on the left side of the display points to the `Display Revision` sub-menu. Press the ENTER key to view the Date, Part Number, Revision, and Checksum of the RLS' operating firmware.

6.9   Alerts/Faults

Alert and Fault messages take over the entire display and remain visible until dismissed by the operator. If the message is longer than four lines, a down arrow in the lower right corner indicates more text is visible by scrolling the display with the W (DOWN) key. The top line is always displayed in upper case letters and is centered

with bullets filling out the line. Alerts and Faults can always be dismissed by pressing
the EXIT or ENTER keys. Example:
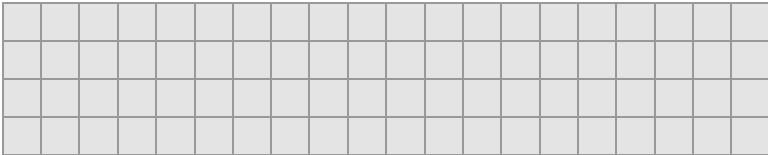
Figure 6-8   Alert Example

6.10   Dynamic Menus and Menu Items

Dynamic menus and menu items only appear if all the required conditions for the
menu have been configured and satisfied. For example, the `Operation\Clean`
`Drive` menu (Section 9.3) only appears when all conditions are correct. Additionally,
the `Operation\Sequential` menu will only appear when one or more tape drives
are configured for Sequential operation.

7.   Resource Management

7.1   Introduction

The physical resources of a RLS tape library may be sub-divided for multiple purposes by allocating tape drives and storage locations (which include Magazine slots and Fixed slots) to specific partitions. The Handler is a shared resource that cannot be dedicated to any single task.

Except for cleaning cartridges, resources cannot be shared between two enabled partitions. A logical library is enabled when it's `Enable:` value is set to `ON` (see section 8.15.1). A drive is enabled when it's `Mode:` value is set to `Sequential, Recycle` or `Dual-Bin` (see Section 8.21.9).

A good example of dedicated resources is that of a Sequential tape drive and its allocated storage locations. A sequential tape drive looks to the host computer as a single tape drive with an operator supplying it with tapes. A host backup, application that is not aware of tape libraries, can simply write its backup data to the drive until the tape becomes filled. It then causes the tape to be rewound and ejected from the drive. The changer can then automatically insert the next tape needed to continue the backup operation. The host application is completely unaware of how the next tape gets inserted into the drive as well as where the tapes come from and go to.

For this example to succeed in an automated tape library, one or more tape cartridges must be dedicated to the Sequential backup performed by the drive. To the changer (referred to as the Medium-changer in the SCSI specifications), the tape drive and a group of cartridges are reserved for that task. These dedicated resources cannot be used for any other purpose. If this example is all that is required of the changer, then only a single drive is installed and all of the cartridges are dedicated to this single task.

However, the RLS libraries are much more flexible than our example. They can perform three modes of sequential backups on multiple tape drives for multiple host systems while simultaneously running multiple random logical library operations with other tape drives and cartridge locations. Before the library is put to use, you have to decide how it is to be used and then allocate the available resources to meet the requirements. This chapter will deal with this task.

7.2 Inventory Mapping

Location designators are described in Section 6.6.3. They are used to access the RLS facilities such as magazine storage and tape drives.

7.2.1 Element Addresses

From the SCSI (or Fibre Channel) interface, cartridge locations are identified by their Element Address. Unlike the permanent and absolute Location designators, each SCSI element address is initially assigned by the RLS, but may be changed by the system installer or host system. Element addresses are 16-bit unsigned integers (0–65535). All elements of the same type (e.g. Storage) are numbered consecutively. Element addresses are only assigned to locations within a Logical Library (see Chapter 7).

7.2.2 Default Element Addresses

Element Addresses are initially assigned by the RLS in sequential order to each type of location. During address assignments, all locations within a sequence are always considered present, even if they are not physically present, e.g. a magazine is not mounted or a tape drive is not installed. The mapping will be reset to the following default values with the Configuration\SET TO DEFAULTS command.

Element Type	Physical Location (Model Dependent)	Default Element Addresses
Storage: Magazine Slots	MA1–MI5	0-(n-1) where n = # slots
Storage: Fixed Slots	F1, F2	20-21
Data Transfer:	T1–T4	63000-63003
Import Export (VIOP)	IA1–IA5	64000-64004
Medium Transport	H	65000

Table 7-1 Default SCSI Element Addresses

7.2.3 Inventory Validation

When the inventory database is invalidated, the RLS scans all locations before it does anything else, and stores the new cartridge location information in its internal inventory database. The inventory database will be invalidated by:

- Loss of RLS Power

- Opening the front panel/door and interrupting the Inventory Sentry beam

- Manually invalidating the inventory with the INVALIDATE command in the Operation\Element Status menu

After an inventory violation:

- The RLS re-scans all locations before it does anything else, to update its internal inventory database.

- Since the host initially has no way of knowing what changes were made to the inventory, the changer sends the host a `CHECK CONDITION` message to notify the host that changes have occurred. The host should then ask for the new information.

If a barcode reader is installed and barcode labels are affixed to the cartridges, barcode information is also stored as part of the inventory information. Barcode labels cannot be read for cartridges that are inside drives.

NOTE

If the Control Panel is used to move a cartridge by the `Operation\Move Cartridge` *command, the changer's internal inventory database is updated, but the host is not informed about the move. In addition, no* `CHECK CONDITION` *is sent to the host.*

7.3   Logical Libraries

When shipped from the factory, all RLS libraries look like a single library with all of its tape drives and storage slots dedicated to the random operation of Library-"a". This is generally the correct configuration for a single-host system running a library specific backup application.

However, when multiple hosts are present and each host needs to run a library specific backup application, then the RLS can be sub-divided into smaller *logical libraries*. Physically, there is still one cabinet with one SCSI Medium-changer within it. That Medium-changer senses the SCSI ID of the host computer that is selecting it and can therefore indicate to that host that only a pre-determined (via the configuration process) list of physical resources are available to it. Up to four of these library partitions are available.

If more than one logical library is to be defined, then a list of tape drives and cartridge locations for each of logical library must be made. No overlapping of resources (for either logical libraries or sequential drives) is allowed and the allocations need not be equal. The drives, fixed locations and magazine slots must be allocated in contiguous ranges (from First-to Last).

7.4   Sequential Operations

A sequential tape drive looks to the host computer as a stand-alone tape drive with an operator supplying it with tapes. A host backup application that is not aware of tape libraries can simply write its backup data to the drive until the tape becomes filled. It then causes the tape to be rewound and ejected from the drive. The Medium-changer can then insert the next tape needed to complete the backup operation. The host

application is completely unaware of how the next tape gets inserted into the drive as well as where the tapes come from and go to. When the Medium-changer does the work of supplying tapes to and removing them from a tape drive, the process is called Sequential operation.

There are three types of Sequential operation: Sequential, Recycle and Dual-Bin. For Sequential or Recycle operation, a single contiguous range of cartridge locations (Input) is assigned to each sequential drive for its exclusive use. Sequential operation stops when the last cartridge has been returned to it original storage slot while Recycle operation will restart the cycle after its completion. To put it another way – Sequential operation is a single pass mode while the Recycle mode runs continuously. In both of these modes, each tape cartridge is returned to its original storage location after it is ejected from the tape drive.

For Dual-Bin operation, two separate ranges of magazine locations are assigned to each sequential drive for its exclusive use. The Input range of locations is where the changer gets cartridges to be placed in the sequential drive. The Output range is where those cartridges are put after the drive has ejected them.

There can be many Sequential or Recycle drives and each requires one contiguous range of magazine storage locations. Each Dual-Bin drive requires two contiguous ranges of magazine storage locations (which do not have to be adjoining). Care should be used when allocating these ranges so that unusable gaps between ranges do not occur as those storage locations may not be available for any other use.

This flexible design allows the user to partition the library's resources to best meet overall system needs. With a RLS-8444, for example, it is possible to have one library serve as the tape storage device for four separate systems. See Chapter 10 for detailed information on Sequential Operation.

7.5   Resource Inventory

The first order of business is to document precisely what is in your RLS. This data will then be used when allocating resources to different partitions. There are 3 to 5 slots per magazine depending on tape technology. Not all mounts may have magazines installed. The following table indicates the resources available for each model.

Model	Technology	Tape Drives	Fixed Slots	Magazines
RLS-8202	LTO	T1, T2	N/A	MA up to MI
RLS-8204	LTO	T1, T2	N/A	MA up to MK
RLS-8204D	LTO	T1, T2	N/A	MA up to MK
RLS-8216C*	LTO	T1, T2	N/A	MA-MD
RLS-8216CD*	LTO	T1, T2	N/A	MA-MD
RLS-8236	LTO	T1, T2	N/A	MA-MI
RLS-8236C*	LTO	T1, T2	N/A	MA-MI
RLS-8236CD*	LTO (DFA)	T1, T2	N/A	MA-MI
RLS-8236D	LTO (DFA)	T1, T2	N/A	MA-MI
RLS-8244	LTO	T1, T2	N/A	MA-MK
RLS-8244D	LTO (DFA)	T1, T2	N/A	MA-MK
RLS-8444	LTO	T1, T2, T3, T4	N/A	MA-MK
RLS-8444D	LTO (DFA)	T1, T2, T3, T4	N/A	MA-MK
RLS-8404	LTO	T1, T2, T3, T4	N/A	MA up to MK
RLS-8404D	LTO (DFA)	T1, T2, T3, T4	N/A	MA up to MK

*VIOP not available on these models

Table 7-2   Available RLS Resources by Model

Fill out the RLS-Model line and the Tape Drive Allocation Table below to indicate which resources are installed in your RLS as well as some of their facts (why not use a pencil or first make a copy of this page). The "MC" row in the table is for the RLS' changer (referred to as a SCSI Medium-changer (MC)). The MC is frequently connected to the same bus as some of the tape drives.

It is possible to have up to four separate SCSI busses connected to a RLS. After Table 7-3 has been filled out, make certain there are no SCSI ID conflicts within each SCSI bus.

7.6   Resource Allocation Worksheet

RLS-Model: RLS-_____

Device	Make	Model	SCSI Bus	SCSI ID	Allocated to:*
MC	Qualstar	RLS-		[0]	
T1				[1]	
T2				[2]	
T3				[3]	
T4				[4]	

Factory Default Values are shown in brackets [default value]
* Allocated to: [Library-a], Library-b, Library-c, Library-d, or Sequential # (where # is the Drive number).

Table 7-3   Tape Drive Allocation Table

Partition	Tape Drives		Fixed Slots		Magazine Slots		VIOP Slots		Initiators
	From {	To |	From }	From ~	To •	To €	From •	To ,	SCSI ID ƒ
Library-a									
Library-b									
Library-c									
Library-d									

Table 7-4   Logical Library Resource Allocations

Partition (drive specific)	Sequential Mode {	Input Mag. Slots		Output Mag. Slots*	
		First |	Last }	First ~	Last •
Sequential-T1					
Sequential-T2					
Sequential-T3					
Sequential-T4					

Sequential Modes: Sequential, Recycle and Dual-Bin (see Section–7.4)

* Output magazine slots used for Dual-Bin mode only. Must be same or greater number of slots than the Input magazine slots.

Table 7-5   Sequential Tape Drive Resource Allocations

7.6.1   Resource Allocation Procedure

1. Fill out the line just above Table 7-3. Otherwise, an LVD/SE label indicates the default SCSI interface for the Medium-changer.

2. Fill out all but the last column of the Tape Drive Allocation chart (Table 7-3). The SCSI bus column may be used to indicate separate busses.

3. Decide if the Medium-changer will be sub-divided with sequential tape drives or logical libraries. If resources will not be sub-divided, then they will all be allocated to *random* Library-a. Fill in the first row for Table 7-4 to match the installed drives and magazine mounts. You are done with this procedure.

4. If there is to be more than one logical library, allocate the tape drives for Library-a in the Resource Allocations table (Table 7-4). Repeat this process for each additional logical library (limited to four). Then allocate the fixed tape slots. Finally allocate the magazine slots for each partition. Although it is permissible to place an allocation dividing line in the middle of a magazine, this is not recommended because when a magazine is manually removed, it may contain

tapes from more than one partition. It is preferable to allocate cartridge locations by whole magazines (3 to 5 slots, model dependent) to any partition. Indicate the SCSI ID of all host computers (SCSI Initiators) which will communicate with each library in the last column.

5. If there are to be any sequential tape drives, fill in Table 7-5 at this time. Line out those drives which are allocated to logical libraries or not installed. Indicate which sequential mode is to be used for each drive. Use the unallocated magazine slots from the Table 7-4 to allocate slots to each sequential drive. Sequential drives running in the Dual-bin mode require two identical slot allocations because of their separate input- and output-bins. The input and output bins need not be adjacent, although that is a good practice.

6. Verify that only existing resources have been allocated and that there are no resources allocated to more than one partition. All resources do not have to be allocated.

7.6.2 Resource Allocation Examples

Example 1: RLS-8444 with all four drives installed. Partitioned into 1 logical library with 1 sequential drive and 1 dual-bin sequential drive. Two host computers at SCSI ID's 14 and 15 are communicating with the Medium-changer.

Partition	Tape Drives		Fixed Slots		Magazine Slots		VIOP Slots		Initiators
	From {	To |	From }	From ~	To •	To €	From •	To ,	SCSI ID ƒ
Library-a	T1	T4	N/A	N/A	MA1	MF5	MG1	MG5	14, 15
~~Library-b~~									
~~Library-c~~									
~~Library-d~~									

Partition (drive specific)	Sequential Mode {	Input Mag. Slots		Output Mag. Slots*	
		First |	Last }	First ~	Last •
~~Sequential-T1~~					
~~Sequential-T2~~					
Sequential-T3	Sequential	MH1	MH5	N/A	N/A
Sequential-T4	Dual-Bin	MI1	MI5	ME01	ME05

Example 2: RLS-8236 with all four drives installed. Partitioned into 2 logical libraries and no
sequential drives.

Partition	Tape Drives		Fixed Slots		Magazine Slots		VIOP Slots		Initiators
	From {	**To** ▌	**From** }	**From** ~	**To** •	**To** €	**From** •	**To** ,	**SCSI ID** ƒ
Library-a	T1	T2	N/A	N/A	MA1	MC5	MD1	MD5	6,14
Library-b	T3	T4	N/A		ME1	MG5	MH1	MI5	7,15
~~Library-c~~									
~~Library-d~~									

7.7   Configuring the RLS for the Desired Allocations

Follow this procedure to change the resource allocation for more than one logical
library (library-a) or the addition of sequential tape drives. This procedure assumes
you are familiar with the menu structure and its operation. If not, refer to Chapter 6.
for instructions.

Note

*The RLS will not allow a single resource to be allocated to two or more enabled partitions.
Partitions are disabled automatically if a change is made to any resource allocation. (Library to
OFF, Drive to Random, etc.). The partition cannot be re-enabled if an overlapping condition
occurs.*

1.   Allocate the drives, fixed and magazine slots for Logical Library-a. Refer to the
      `Configuration\Advanced\Library ?` table below (Table 7-6) to set the
      indicated value or the values from the columns indicated in the Logical Libraries
      Resource Allocations table (Table 7-4). Leave all Logical Libraries disabled
      (`Enable: OFF`) until any sequential tape drives have been configured (refer to
      Section 8.15).

2.   If necessary, repeat Step 1 for each logical library b–d.

Configuration\Advanced\Library ? menu	
Variable	**Value** **From Column # of Table 7-4**
Enable:	OFF
Drive First:	1
Drive Last:	2
Fixed First:*	3
Fixed Last:*	4
Slot First:	5
Slot Last:	6
VIOP First	7
VIOP Last	8

"?" represents the partition being configured (a, b, c, or d)

* found only on RLS-4221

Table 7-6   Configuration\Advanced\Library ?

3. Unlock and open the front panel before configuring the tape drives. Any given drive can be allocated to a Logical Library or sequential operation, but not both.

4. If logical libraries exist, indicate which SCSI Initiators each library responds to in the Configuration\Advanced\SCSI\Library menu as indicated in column 9 of the Logical Library Resource Allocations table (Table 7-4).

5. Enter the Configuration\Drive\T1 menu (see Sections 8.20 and 8.21). If this drive is assigned to a logical library, be certain that its Mode: value is set to Random. If the Mode: value is set to Random, then ignore the input and output range values. Refer to the Configuration\Drive\T? table below to set the values in the Sequential Tape Drive Resource Allocations table (Table 7-5).

6. Repeat step 4 for each installed tape drive (T2…T4).

Configuration\Drive\T? menu	
Variable	**Value from Column #** **of Table 7-5**
Mode:	1
Input First:	2
Input Last:	3
Output First:	4
Output Last:	5

"?" represents the tape drive being configured (T1, etc.).

Table 7-7   Configuration\Drive\T?

7. Configure each library and drive according to all of the parameters of Sections 8.15 and 8.21.

8. Now enable the active Logical Libraries by changing their `Configuration\Advanced\Library ?\Enable:` values to `ON`. If the value cannot be set to ON, the problem may be that a resource has been allocated to more than one library or sequential drive.

9. If logical libraries exist, each one must know to which SCSI initiators (host computers) it should respond. For each logical library, set its letter (a–d) following each Initiator ID that it is to respond to in the `Configuration\Advanced\SCSI\Library` menu (refer to Section 8.18.6).

8.   The Configuration Menu

```
.......Configuration
·Advanced
·Drive
·Fibre Channel
·Q-Link
SCSI ID:        dd
·Security
SET TO DEFAULTS
```

```
LEGEND
l = location designator
d = decimal digit
x = hexadecimal digit
? = alphanumeric character
```

```
C...........Advanced
·Changer
·Command
·Control Panel
·Fibre Channel
·Library
·Log
·SCSI
```

```
Configuration··Drive
·T1:          NONE
·T2:          NONE
·T3:          NONE
·T4:          NONE
```

```
C·Advanced···Changer
Busy:          WAIT
Filter Days:   ddd
·Labels
·Mechanics
Power On Clear:YES
·VIOP
```

```
C·Drive··········T?
Mdl:??????????????
SN: ??????????????
Enabled:        YES
SCSI Bus:   CHANGER
SCSI Id:         ??
Term Power:     OFF
WWN:       XXXXXXXX
           XXXXXXXX
Clean Loc.: llllll
Eject:         HOST
POWER CYCLE
Mode:        RANDOM
Start:       MANUAL
Input First:llllll
Input Last: llllll
Input Slots:    ddd
OutputFirst:llllll
OutputLast: llllll
OutputSlots:    ddd
```

```
CA·Changer······VIOP
Export:         YES
Import:         YES
```

```
CA·Changer·Mechanics
Model:         NONE
BCR:           NONE
Carriage:         A
Q-Link:        NONE
```

```
CA·Changer····Labels
CheckCharacter:YES
Fixed:         SOME
Magazine:      SOME
Sequential:    SOME
```

```
C......Fibre Channel
·Device
Id Mode  0:    SOFT
Loop Id  0:     nnn
Topology 0:    LOOP
Id Mode  1:    SOFT
Loop Id  1:     nnn
Topology 1:    LOOP
```

```
C·Advanced···Command
C:xxxxxxxxxxxxxxx
 Id:      xxxxxxxx
 Iv:          xxxx
 SN:    dddddddddd
```

```
CA·····Control Panel
·Alarm
Contrast:       ddd
·Display
```

```
CFC···········Device
·0 ??????????????
·1 ??????????????
·2 ??????????????
·3 ??????????????
·4 ??????????????
·5 ??????????????
·6 ??????????????
·7 ??????????????
·8 ??????????????
·9 ??????????????
·10??????????????
·11??????????????
·12??????????????
·13??????????????
·14??????????????
·15??????????????
RESCAN
```

```
CACP········Display
Dispaly:    CURRENT
Line 1:     DEFAULT
  1-10: ??????????
  11-20: ??????????
Line 2:     DEFAULT
  1-10: ??????????
  11-20: ??????????
Line 3:     DEFAULT
  1-10: ??????????
  11-20: ??????????
Line 4:     DEFAULT
  1-10: ??????????
  11-20: ??????????
COPY TO CURRENT
COPY TO SAVED
```

```
CACP···········Alarm
Door Open:     dddd
Handler Error:dddd
Inventory Vio:dddd
I/O Waiting:   dddd
```

```
C·············Q-Link
Ip:000.000.000.000
Ma:000.000.000.000
Gw:000.000.000.000
Use DHCP:       OFF
Link Status:     UP
MAC:  xxxxxxxxxxxx
Date:    mm/dd/yyyy
Part Number:700xxx
Revision:     d.d.d
Checksum: xxxxxxxx
RESET
SET ADDRESSES
DEL ADMIN PASSKEY
```

```
CA·····Fibre Channel
Alarm:           NO
Ch0 FC Speed: AUTO
Ch0 SCSI ID:     dd
Ch1 SCSI ID:     dd
Ch0 SCSI Speed:160
Ch1 SCSI Speed:160
CLEAR LOG
Router LUN:    SOFT
·Set Time
```

```
CAFC········Set Time
Date Day:       dd
Date Month:     dd
Date Year:     dddd
Time Hour:      dd
Time Minute:    dd
SET TIME
```

```
C···········Security
Configuration: OFF
Inventory:     OFF
Master:        OFF
```

```
CFC Device········??
SCSI Channel:    d
SCSI Id:        dd
SCSI Lun:        d
Manuf:????????????
Model:???????????
```

Continued in Figure 8-2

Figure 8-1   The Configuration Menu (Part 1)

The `Configuration` menu is used to customize the operation of the RLS libraries to meet the system requirements. The `Configuration` menu consists of several sub-menus, some affecting the unit's interaction with the SCSI system, and others affecting the unit's interaction with the user. Once the items in the `Configuration` menu have been customized, the `Configuration` menu should not have to be revisited, unless the configuration of the changer or the SCSI system (e.g. adding or removing tape drives) is changed.

The following sections explain each menu in detail. An explanation of the display and detailed instructions on navigating the menu system are contained in Chapter 6. Not all values or menu items appear at all times; some depend upon the model of library in use, other configuration parameters and incomplete prerequisite conditions. Menu items and values appear in alphabetic order in the menus or lists of menu items.

Continued from Figure 8-1

```
C·Advanced·······Log
BDC:            OFF
Carousel:       OFF
Carrier:        OFF
Clean:           ON
Configuration:   ON
Contend:        OFF
Control:        OFF
DriveBay:       OFF
FC Events:      OFF
FC Replies:     OFF
FC States:      OFF
I2c:            OFF
Inventory:      OFF
Pic:            OFF
Process:        OFF
RBT Actions:     ON
RBT Activity:    ON
RBT Events:      ON
RBT Isr:        OFF
RBT Job:        OFF
RBT Operation:  OFF
RBT Results:     ON
SCSI Commands:   ON
SCSI Interrupt:  ON
SCSI Phases:     ON
SCSI States:     ON
Sensor:         OFF
Sequential:      ON
Storage Array:  OFF
```

```
LEGEND
l = location designator
d' = decimal digit
x = hexadecimal digit
? = alphanumeric character
```

```
C·Advanced···Library
·a          ENABLED
·b         DISABLED
·c         DISABLED
·d         DISABLED
```

```
C·Advanced·LIbrary·?
Enable:          ON
Drive First:llllll
Drive Last: llllll
Drives:          dd
Fixed First:llllll
Fixed Last: llllll
Fixeds:          dd
Slot First: llllll
Slot Last:  llllll
Slots:          ddd
VIOP First: llllll
VIOP Last:  llllll
VIOPs:          ddd
DT Serial: 00 FILL
·ElementAddress
·Inquiry:    NATIVE
Storage Order: MAG
Volume Tag Pad:SPC
```

```
CAL·?·ElementAddress
Display:      SAVED
Data Transfr:ddddd
Imp/Export:   ddddd
Medium Trans:ddddd
Storage:      ddddd
```

```
CAL·?·········Inquiry
 Inquiry:      NATIVE
   xxxxxxxxxxxxxxxx
        ????????
  ????????????????
         ????
   xxxxxxxxxxxxxxxx
   xxxxxxxxxxxxxxxx
        xxxxxxxx
```

```
C·Advanced······SCSI
·Library
Disconnect:      ON
Enable:          ON
LUN:              0
Parity:       ABORT
Synchronous:    OFF
Term Power:      ON
```

```
CA·SCSI······Library
Initiator 0:     a
Initiator 1:     a
Initiator 2:     a
Initiator 3:     a
Initiator 4:     a
Initiator 5:     a
Initiator 6:     a
Initiator 7:     a
Initiator 8:     a
Initiator 9:     a
Initiator 10:    a
Initiator 11:    a
Initiator 12:    a
Initiator 13:    a
Initiator 14:    a
Initiator 15:    a
```

Figure 8-2   The Configuration Menu (Part 2)

The Legends in Figure 8-1 and Figure 8-2 indicate the types of digits found in the value items of the `Configuration` menu's sub-menus. An explanation of each type is given below in Table 8-1.

Legend	Explanation
d	**Decimal** digit (0-9): A Decimal value contains one or more decimal digits, indicating the present value of the item. Example: **Element** address (sometimes abbreviated **Elem.**): This value is the address used by the SCSI host to select a system element. Address values range from 0 to 65535.
l	**Location Designators**: This value describes the physical location of a cartridge, tape drive, etc. See Section 6.6.3
x	**Hexadecimal** digit (0-9, A-F): A hexadecimal value contains one or more hexadecimal digits, indicating the present value of the item.
?	**Alphanumeric** character: An alphanumeric value contains one or more alphanumeric characters, indicating the present value of the item.

Table 8-1 Legend of Configuration Menu's Digits

8.1   Configuration\Security Menu

```
C•••••••••••Security
 Configuration: OFF
 Inventory:     OFF
 Master:        OFF
```

NOTE

All items in this menu are locked by the Door Lock.

There are four types of security locks in the changer's menu system: `Configuration`, `Inventory`, `Master` and Door. They are used to prevent inadvertent or unauthorized modification of the library's configuration or inventory. The locks are also used to prevent any kind of unauthorized manual operations.

The Security menu is used to set the first three locking items to `ON` or `OFF`. The Door lock is controlled by opening or closing the front panel. For example, when the panel is open, the Door lock is unlocked (OFF). When the panel is closed, the Door lock is locked (ON). The Door lock's unlocked state (cabinet front panel open) is equivalent to the `OFF` condition for the other three types of security locks.

Setting any or all of the security locks to `ON` does not disable navigation through the menu structure, rather it simply prevents certain values from being changed, or the

execution of certain commands. When an item is secured by more than one lock, all of the locks used to secure the item must be set to OFF, before the locked item can be changed or executed.

If an attempt is made to change or invoke a locked item, an Alert message appears in the display, explaining why it cannot be changed or invoked. Table 8-2 shows which items can be secured by each of the four security locks.

8.1.1 Door Lock

The Door lock provides an added measure of security, because the Door lock controls access to the items in the Security menu. Since the Security menu items are used to open or lock the other three security locks (Configuration, Inventory and Master), locking the front panel and controlling access to the key prevents any person without a key from opening or locking the other three security locks.

Example:
If a menu item is locked by the Door lock (see Table 8-2), the menu item can only be changed while the cabinet door is open. Therefore, the cabinet door must first be unlocked with the key, and then opened, before the locked menu item can be changed.

8.1.2 Configuration Lock

When the Configuration lock is ON, certain values found in the Configuration menu cannot be changed. This prevents unauthorized changes to a secured changer configuration.

8.1.3 Inventory Lock

When the Inventory lock is ON, cartridges cannot be moved and the inventory cannot be invalidated using commands in the Operation menu.

8.1.4 Master Lock

The Master lock provides the maximum system security. When the Master lock is set to ON, the control keys cannot be used to change the changer's configuration, initiate any operations, or execute any commands. Only the host system can control the changer, effectively configuring the system for remote operation only.

Door Lock	Configuration Lock	Inventory Lock	Master Lock	Menu	Item
				\Configuration	SCSI ID:
					SET TO DEFAULTS
				\Configuration\Advanced\Changer	*all items*
				\Configuration\Advanced\Changer \Labels	*all items*
				\Configuration\Advanced\Changer \Mechanics	*all items*
				\Configuration\Advanced\Changer \VIOP	*all items*
				\Configuration\Advanced\Control Panel\Alarm	*all items*
				\Configuration\Advanced\Control Panel\Display	*all items except* Display:
				\Configuration\Advanced\Fibre Channel	*all items*
				\Configuration\Advanced\Fibre Channel\Set Time	*all items*
				\Configuration\Advanced\Library ?	Enable:, Drive First:, Drive Last:, Fixed First:, Fixed Last:,Slot First:, Slot Last:, VIOP First:, VIOP Last:, Storage Order:
					DT Serial:, Inquiry:, Volume Tag Pad:
				\Configuration\Advanced\Library ? \ElementAddress	*all items except* Display:
				\Configuration\Advanced\Library ? \Inquiry	*all items except* Inquiry:
				\Configuration\Advanced\Log	*all items*
				\Configuration\Advanced\SCSI	Disconnect:, Enable:, Parity:, Synchronous:, Term Power:
					LUN:
				\Configuration\Advanced\SCSI \Library	*all items*
				\Configuration\Drive T?	Mdl:, SN:, Enabled:, Mode:, Start:, Input First:, Input Last:, OutputFirst:, OutputLast:,
					SCSI Id:, Term Power:, Clean Loc.:, Eject
					POWER CYCLE
				\Configuration\Fibre Channel	*all items*
				\Configuration\Fibre Channel\Device	RESCAN
				\Configuration\Q-Link	*all items*
				\Configuration\Security	*all items*
				\Maintenance\Log	CLEAR, LOCK, UNLOCK
				\Operation\Clean Drive	*all items*
				\Operation\Demonstrations	START RANDOM MOVES
				\Operation\Element Status	INITIALIZE, INVALIDATE
				\Operation\Move Cartridge	MOVE
				\Operation\Sequential\T?	EMPTY, START, STOP
				\Operation\Unload Drive	*all items*

Table 8-2   RLS Security Locks

8.2   Configuration Menu

```
••••••••Configuration
•Advanced
•Drive
•Fibre Channel
•Q-Link
SCSI ID:          dd
•Security
SET TO DEFAULTS
```

This menu is the root configuration menu. It contains sub-menus and commands.

8.2.1   SCSI ID

NOTE

SCSI ID is locked by the Door Lock, Configuration Lock and the Master Lock. See Section 8.1.

Assigns a SCSI ID to the Medium-changer. Valid values are 0 through 15 with 0 being the initial value. This value is not changed by the SET TO DEFAULTS command.

8.2.2   SET TO DEFAULTS

```
••SET TO DEFAULTS•••
 All configuration
 items will be set.
 ENTER to proceed.
```

NOTE

SET TO DEFAULTS is locked by the Configuration Lock and the Master Lock.

This command resets most items in the Configuration menu having a default value to their factory default settings. Select SET TO DEFAULTS, then press the ENTER key to execute the command. SCSI ID's (changer or drives) are not changed by this command. Default values, if any exist, are given in the individual descriptions for each menu item.

8.3   Configuration\Advanced Menu

```
C•••••••••••Advanced
 •Changer
 •Command
 •Control Panel
 •Fibre Channel
 •Library
 •Log
 •SCSI
```

This `Configuration\Advanced` menu lists six sub-menus.

8.4   Configuration\Advanced\Changer Menu

```
C•Advanced•••Changer
 Busy:        WAIT
 Filter Days    ddd
 •Labels
 •Mechanics
 Power On Clear:YES
 •VIOP
```

NOTE

All items in this menu are locked by the Configuration Lock and the Master Lock. See Section 8.1.

This menu permits control of certain aspects of RLS operation.

8.4.1   Busy

This value determines how the changer responds to the host if it receives a command while it is busy.

BUSY	The changer returns a BUSY status to the host.
WAIT	The changer will wait until it is not busy before executing the command. If it is allowed, the changer will disconnect from the SCSI bus (default value).
NOT READY	The changer returns a CHECK CONDITION status with a Sense Key value of NOT READY, plus the appropriate information in the ASC and ASCQ data. Refer to the RLS SCSI-2 Interface Manual, Qualstar document number 501551.

8.4.2   Filter Days

The `Filter Days` value determines how often the changer reminds the operator to check the air filter. The default value is 120 power-on days. The maximum value permitted is 365 power-on days.

The time from the last reset of the Filter Days parameter is counted by the power-on filter timer. When the cumulative filter time reaches the value specified by the `Filter Days` parameter, the "Check the air filter" alert message appears on the Control Panel Display. The alert message will not appear on the Control Panel Display while any menu is displayed, but it will appear within one minute after exiting the menu system. Power interruptions *do not* affect the power-on filter count or reset the counter to zero.

When the air filter alert message appears, pressing either the ENTER key or the EXIT key will dismiss the message. If the ENTER key is pressed, the power-on filter timer is reset to zero. Then, the alert message will not reappear until the cumulative power-on-days exceeds the `Filter Days` value once more. If the EXIT key is pressed, the timer continues to count. In this case, the alert message will reappear within one minute after the EXIT key is pressed, unless the `Filter Days` value is increased.

The optimum value for the time between air filter changes depends upon the cleanliness of the operating environment. Start with the default value of 120 days. Then, after gaining experience with the operating environment, adjust the `Filter Days` value to fit the particular operating conditions. The procedure for checking the air filter is given in Chapter 10.

8.4.3   Power On Clear

The `Power On Clear` value determines how the changer deals with the abnormal presence of a cartridge in the Handler when RLS power is applied. The default (and generally preferred) `Power On Clear` value is YES.

YES   If a cartridge is present in the Handler when RLS power is applied and the `Power On Clear` value is set to YES, the changer stores the cartridge in an available magazine location. If no magazine location is available, then the cartridge remains where it is.

NO   If there is a cartridge in the Handler when RLS power is applied, it remains where it is, and it is up to the SCSI host to store the cartridge.

8.5   Configuration\Advanced\Changer\Labels Menu

```
CA•Changer••••Labels
 CheckCharacter:YES
 Fixed:       SOME
 Magazine:    SOME
 Sequential:  SOME
```

NOTE

All items in this menu are locked by the Configuration Lock and the Master Lock. See Section 8.1.

8.5.1   CheckCharacter

The `CheckCharacter` value determines whether the changer expects a check character on barcode labels.

YES   A barcode label must contain a valid check character in order to be read with valid status. It is possible for some labels without check characters to read correctly, because the last character on the label happens to be the same as a valid check character for the preceding characters (default value).

If the labels do not have check characters, approximately 2% of them will read without error but will have one less character than expected.

NO   The changer will not expect a check character. However, if one is present, it will appear as an extra character in the barcode label data.

8.5.2   Fixed

The `Fixed` value indicates whether barcode labels are expected in the Fixed slots of the library. `Fixed` only appears in the menu when a Barcode Reader is installed.

`Fixed` Labels is a multiple-choice value with the options listed below:

SOME   The changer expects *some* cartridges in the Fixed Labels area to contain barcode labels.
All cartridges in the Fixed Labels area are scanned for barcodes.
Invalid barcode labels *are not* rescanned (default value).

ALL   The changer expects *all* cartridges in the Fixed Labels area to contain barcode labels.
All cartridges in the Fixed Labels area are scanned for barcodes.
Invalid barcode labels *are* rescanned.

NONE   The changer does not scan cartridges in the Fixed Labels area for barcode labels.

8.5.3   Magazine

The `Magazine` value indicates whether barcode labels are expected in the Magazine slots, Handler, VIOP and tape drives.
`Magazine` only appears in the menu when a Barcode Reader is installed.

`Magazine` is a multiple-choice value with the options listed below:

SOME   The changer expects *some* cartridges in the Mag. Labels area to contain barcode labels. All cartridges in the Mag. Labels area are scanned for barcodes. Invalid barcode labels *are not* rescanned (default value).

ALL   The changer expects *all* cartridges in the Mag. Labels area to contain barcode labels. All cartridges in the Mag. Labels area are scanned for barcodes. Invalid barcode labels *are* rescanned.

NONE   The changer does not scan cartridges in the Mag. Labels area for barcode labels.

8.5.4   Sequential

The `Sequential` value indicates if barcode labels are expected in magazine locations allocated to Sequential operation.

`Sequential` is a multiple-choice value with the options listed below:

SOME   The changer expects *some* cartridges in the Sequential area to contain barcode labels. All cartridges in magazines of the allocated locations and tape drives are scanned for barcodes. Invalid barcode labels *are not* rescanned (default value).

ALL   The changer expects *all* cartridges in the Sequential area to contain barcode labels. All cartridges in magazines of the allocated locations and the tape drives are scanned for barcodes. Invalid barcode labels *are* rescanned.

NONE   The changer does not scan cartridges in the Sequential area or the tape drives for barcode labels.

8.6 Configuration\Advanced\Changer\Mechanics Menu

```
CA•Changer Mechanics
 Model:        4221
 BCR:    LHA7127RR1S
 Carriage:        A
 Q-Link:       NONE
```

NOTE

All items in this menu are locked by the Door Lock, Configuration Lock and the Master Lock. See Section 8.1.

The `Configuration\Advanced\Changer\Mechanics` menu describes the hardware configuration of the RLS. The values in this menu are factory-set to reflect the unit's configuration at the time of shipping and are not changeable.

In the following paragraphs, no default values are given, as they vary from unit to unit.

8.6.1 Model

This value defines the model number of the RLS: 4221, etc.

8.6.2 BCR

This value defines the type of barcode reader currently installed:
    `NONE, or LHA7127RR1S`

8.6.3 Carriage

This value defines which Carriage Assembly is currently installed:
    `A or B`

8.6.4 Q-Link

This value indicates whether Q-Link is currently installed: `YES` or `NONE`.

8.7 Configuration\Advanced\Changer\VIOP Menu

```
CA•Changer••••••VIOP
 Export:        YES
 Import:        YES
```

NOTE

All items in this menu are locked by the Configuration Lock and the Master Lock.
See Section 8.1.

8.7.1 Export

This value controls the changer's access to the VIOP slots. It also sets the value of the Export Enable bit in the SCSI Read Element Status and Read Volume Element Address commands.

Export is a multiple-choice value with the options listed below.

YES   The changer is allowed to place cartridges into the VIOP slots, and the value of the Export Enable bit is set to one (default value).

NO   The changer is not allowed to place cartridges into the VIOP slots, and the value of the Export Enable bit is set to zero. This prevents the host or menu operations from presenting cartridges to the operator.

8.7.2 Import

This value controls the changer's access to the VIOP slots. It also sets the value of the Import Enable bit in the SCSI Read Element Status and Read Volume Element Address commands.

Import is a multiple-choice value with the options listed below.

YES   The changer is allowed to remove cartridges from the VIOP slot, and the value of the Import Enable bit is set to one (default value).

NO   The changer is not allowed to remove cartridges from the VIOP slot, and the value of the Import Enable bit is set to zero. This prevents the host or menu operations from accepting cartridges into the system.

8.8 Configuration\Advanced\Command Menu

```
C•Advanced•••Command
 C:xxxxxxxxxxxxxxxx
 Id:       xxxxxxx
 Iv:          xxxx
 SN:    dddddddddd
```

This menu allows for the implementation of the Capacity on Demand (COD) feature on RLS-8204 models and also permits control of certain aspects of RLS operation when under the guidance of Qualstar Technical Support staff.

8.8.1 C:

The `C:` value is where a unique 16 digit hexadecimal code is entered to implement the Capacity on Demand (COD) feature or additional information under the direction of Qualstar Technical Support staff.

8.8.2 Id:

The `Id:` value is a unique set of characters that identify a specific RLS.

8.8.3 Iv:

The `Iv:` value indicates the number of commands that have been accepted successfully by the RLS operating system.

8.8.4 SN:

This is the serial number of the RLS and is non-editable.

8.9 Configuration\Advanced\Control Panel Menu

```
CA•••••Control Panel
 •Alarm
Contrast:        41
 •Display
```

The `Configuration\Advanced\Control Panel` menu allows customizing the Control Panel to suit the environment. The Control Panel Display, back lighting and contrast can be changed with this menu.

8.9.1   Contrast

Contrast indicates the Control Panel Display contrast setting. There are 65 contrast settings (0–64). Select the one that is easiest to read. The optimum value changes with the height of the viewer. The default value is 41.

8.10   Configuration\Advanced\Control Panel\Alarm Menu

```
CACP•••••••••••Alarm
 Door Open:    dddd
 Handler Error:dddd
 Inventory Vio:dddd
 I/O Waiting:  dddd
```

NOTE

All items in this menu are locked by the Configuration Lock and the Master Lock. See Section 8.1.

The changer can provide an audible alert tone for certain alarm conditions. This menu allows selection of the tone for each of the indicated alarm conditions. The values indicated approximate the tone's frequency in Hertz. When editing the values, the new tone can be heard for approximately one second after each change. Determine the pitch of each alarm tone by setting a value from 0001 through 9999. Higher values result in higher-pitched alarm tones. For no alarm tone at all, set the value to 0000.

8.10.1   Door Open

This alarm sounds whenever the door is opened. The default value is 0000.

8.10.2   Handler Error

This alarm sounds whenever the handler has a problem which requires manual intervention (e.g. a stuck cartridge). The default value is 3700.

8.10.3   Inventory Vio(lation)

A condition has occurred, such as breaking the Inventory Sentry beam, which may have compromised the integrity of the inventory. The default value is 4700.

8.10.4   I/O Waiting

This alarm sounds whenever a cartridge in placed in a VIOP slot. The alarm will be reset whenever the VIOP door is opened or the operator presses any keyboard button. The default value is 1800.

8.11 Configuration\Advanced\Control Panel\Display Menu

```
CACP••••••••Display
 Display:   CURRENT
 Line 1:    DEFAULT
   1-10: ??????????
  11-20: ??????????
 Line 2:    DEFAULT
   1-10: ??????????
  11-20: ??????????
 Line 3:    DEFAULT
   1-10: ??????????
  11-20: ??????????
 Line 4:    DEFAULT
   1-10: ??????????
  11-20: ??????????
 COPY TO CURRENT
 COPY TO SAVED
```

NOTE

All items in this menu except Display are locked by the Configuration Lock and the Master Lock See Section 8.1.

This menu allows customizing the Operating Display (while not in the menu system). Any or all four of the display lines can be changed to static alphanumeric strings of choice.

Display Files

There are three sets of display data: CURRENT, SAVED, and DEFAULT. The host can read all three sets of display data, and can change the CURRENT set or the SAVED set.

In addition, the CACP Display menu can be used to manually edit the CURRENT or SAVED files. The SAVED or DEFAULT files can also copied to the CURRENT file, or the CURRENT or DEFAULT files can copied to the SAVED file.

Each of the four display lines (Line 1-Line 4) requires three menu values as follows:

Line#: DEFAULT or Line #: CUSTOM	This line is not editable. Initially, DEFAULT is displayed. If any changes have been made to the display contents for the indicated line, CUSTOM is displayed.
1-10:	This line displays the first ten characters of the indicated line. The alphanumeric string value may be edited.
11-20:	This line displays the last ten characters of the indicated line. The alphanumeric string value may be edited.

The COPY TO CURRENT and COPY TO SAVED functions appear dynamically, depending upon the set being displayed or edited. For example, if the CURRENT set is displayed or being edited, or the DEFAULT set is displayed, the COPY TO SAVED

function appears. The contents of the CURRENT set will always be displayed when in the Operating Display.

8.12 Configuration\Advanced\Fibre Channel Menu

```
CA•••••Fiber Channel
 Alarm:          NO
 Ch0 FC Speed:  AUTO
 CH0 SCSI ID:     dd
 CH1 SCSI ID:     dd
 CH0 SCSI Speed: 160
 CH1 SCSI Speed: 160
 CLEAR LOG
 Router LUN:    SOFT
 Set Time
```

NOTE

All items in this menu are locked by the Configuration Lock and the Master Lock See Section 8.1.

This menu permits control of certain aspects of the Fiber Channel Options operation.

8.12.1 Alarm

An audible alarm on the Fibre Channel Bridge interface is sounded if a warning or error event is reported by the Fibre Channel Bridge.

YES   If the Alarm value is set to YES, the audible alarm is enabled.

NO   If the Alarm value is set to NO, the audible alarm is disabled.

8.12.2 Ch0 FC Speed (Fibre Channel Type B and C)

This value selects the FC link speed: AUTO, 1Gb or 2Gb. AUTO will attempt to negotiate the 2Gb speed and fall back to 1Gb if it is unsuccessful. 1Gb and 2Gb values will only negotiate their respective values.

The default is AUTO.

8.12.3 Ch0 / Ch1 SCSI ID (Fibre Channel Type B and C)

This value is a number from 0 to 15 that corresponds to the SCSI Channels 0 and 1 initiator id. The number of entries will depend on the Fibre Channel Bridge selected.

The default SCSI Id is 7.

8.12.4 Ch0 / Ch1 SCSI Speed (Fibre Channel Type B and C)

This value is a selection 160, 80, or 40, that corresponds to the highest negotiated SCSI bus speed of the FC SCSI Channel 0/1 Initiator. The number of entries will depend on the Fibre Channel Bridge selected.

The default is SCSI Speed 160.

8.12.5 CLEAR LOG

Invoking this command will clear the Fibre Channel Bridge internal event log.

8.12.6 Router LUN

The Fibre Channel Bridge interface is assigned a SCSI address Lun, for configuration and management features. This menu options selects the method used to assign the router Lun address.

NONE	The Router Lun is disabled. No address is assigned.
SOFT	The Router Lun is assigned the next address after the last physical SCSI device.
0-15	Assigns the Router Lun an address value of 0 to 15.
	The default value is 0.

NOTE

For Windows NT/2000 users: Type B Fibre Channel Bridge's require the Router Lun to be set to 0 for libraries with 7 or more drives.

8.13 Configuration\Advanced\Fibre Channel\Set Time Menu

```
CAFC••••••••Set  Time
 Date Day:          dd
 Date Month:        dd
 Date Year:       dddd
 Time Hour:         dd
 Time Minute        dd
 SET TIME
```

NOTE

All items in this menu are locked by the Configuration Lock and the Master Lock See Section 8.1.

The `Configuration\Advanced\Fibre Channel\Set Time` menu is used to set the Fibre Channel Bridge's real time clock. The date and time values that are

displayed are not current. They reflect the values obtained from the last power-on or configuration update.

The Fibre Channel Bridge uses the real time clock to timestamp log events. Note that the time is not critical to normal operations.

8.13.1 Date Day

This value is a number from 1 to 31.

8.13.2 Date Month

This value is a number from 1 to 12.

8.13.3 Date Year

This value is a number from 1970 to dddd.

8.13.4 Time Hour

This value is a number from 0 to 23.

8.13.5 Time Minute

This value is a number from 0 to 59.

8.13.6 SET TIME

Invoking this command will set the Fibre Channel Bridge's real time clock to the date/time values that are displayed.

8.14 Configuration\Advanced\Library Menu

```
C•Advanced•••Library
•a:         ENABLED
•b:         DISABLED
•c:         DISABLED
•d:         DISABLED
```

The RLS may be partitioned into as many as four logical libraries. Within each logical library is a range of tape drives, fixed and magazine storage locations and certain SCSI operating parameters exclusive to that logical library. The handler is shared by all logical libraries. A VIOP may be assigned to any library.

The RLS is normally shipped with all resources allocated to a single logical library: "a".

This menu lists the four logical library partitions (a, b, c, d) and whether or not each partition is enabled. Each partition listed is actually a sub-menu where the partition is configured. See Chapter 7 – Resource Management – for more information on multiple logical libraries.

8.15   Configuration\Advanced\Library\? Menu

```
C•Advanced•Library•?
 Enable:        ON
 Drive First:llllll
 Drive Last: llllll
 Drives:        dd
 Fixed First:llllll
 Fixed Last: llllll
 Fixeds:        dd
 Slot First: llllll
 Slot Last:  llllll
 Slots:        ddd
 VIOP First: llllll
 VIOP Last:  llllll
 VIOPs:        ddd
 DT Serial:  00 FILL
 •ElementAddress
 •Inquiry     NATIVE
 Storage Order: MAG
 Volume Tag Pad:SPC
```

NOTE

All items in this menu except DT Serial, Inquiry, and Volume Tag Pad are locked by the Door Lock, Configuration Lock and the Master Lock. DT Serial, Inquiry, and Volume Tag Pad are locked by the Configuration Lock and the Master Lock. See Section 8.1.

This menu is used to enable a given logical partition (logical library) and to allocate resources to the enabled partitions within the RLS. There are four possible logical libraries (a, b, c, d). The choice of which logical library to edit is made in the parent of this menu. When all resources are allocated to a single logical library, disable all partitions except "a". The values and sub-menus within this menu only affect the selected partition (logical Library).

8.15.1   Enable

This value controls whether the logical library partition may respond to a SCSI Initiator (host system). During normal operation, the Enable value should always be set to ON for a library operating under host control. However, it may sometimes become desirable to take the library off-line, for test or demonstration purposes, or when the Medium-changer is used strictly in the Sequential mode. The changer will automatically turn Enable OFF whenever any resource allocation is changed. After partitioning the library, turn Enable ON.

The `Enable` is a multiple-choice value with the options listed below:

OFF   The library does not respond to the SCSI selection process or to the SCSI bus RESET command (as if the unit was not connected to the SCSI bus).

ON   Select this option for normal operation (default value).

8.15.2 Drive First

This value defines the first tape drive assigned to this partition. The drives are numbered from T1 to T4. All tape drives from Drive First: to Drive Last: (inclusive) will be allocated to the selected partition.

8.15.3 Drive Last

This value defines the last tape drive assigned to this partition. The drives are numbered from T1 to T4. All tape drives from Drive First: to Drive Last: (inclusive) will be allocated to the selected partition.

8.15.4 Drives

This value indicates the number of tape drives assigned to this partition and is not editable.

8.15.5 Fixed First

This value defines the first fixed slot assigned to this partition. The slots are numbered from `F1` and `F2` (RLS-4221 only). All slots from Fixed First: to Fixed Last: (inclusive) will be allocate

d to the selected partition.

8.15.6 Fixed Last

This value defines the last fixed slot assigned to this partition. The slots are numbered from `F1` and `F2` (RLS-4221 only). All slots from Fixed First: to Fixed Last: (inclusive) will be allocated to the selected partition.

8.15.7 Fixeds

This value indicates the number of fixed slots assigned to this partition and is not editable.

8.15.8   Slot First

This value defines the first magazine slot assigned to this partition. The slots are numbered from MA1 to MI5 (model dependent). All slots from `Slot First:` to `Slot Last:` (inclusive) will be allocated to the selected partition.

8.15.9   Slot Last

This value defines the last magazine slot assigned to this partition. The slots are numbered from MA1 to MI5 (model dependent). All slots from `Slot First:` to `Slot Last:` (inclusive) will be allocated to the selected partition.

8.15.10   Slots

This value indicates the number of slots assigned to this partition and is not editable.

8.15.11   VIOP First

This value defines the first VIOP slot assigned to this partition. The slots are numbered from IA1 to II5 (model dependent). **VIOP First must be the first slot in a magazine** (example: `IA1, IB1`, etc.). See Figure 8-3.

NOTE

To maximize the use of all available tape slots in an RLS, Magazine A (MA) should be used when assigning a VIOP storage location to a single partition library or when only a single VIOP storage location is desired.

8.15.12   VIOP Last

This value defines the last VIOP slot assigned to this partition. The slots are numbered from IA1 to II5 (model dependent). **VIOP Last must be in the same magazine as VIOP First**. The maximum number of VIOP slots that can be assigned to a particular partition is the capacity of one magazine so for example an RLS-8236 could have VIOP slots assigned from IB1 to IB4. See Figure 8-3.

NOTE

Since no physical entity can be allocated more than once, the number of slots allocated to normal cartridge storage must be reduced by the quantity of slots allocated to VIOP use. Edit the `Slots Last:` *item and set its value to the slot prior to the first VIOP slot.*

8.15.13 VIOPs

This value indicates the number of slots assigned for VIOP use in this partition and is not editable.
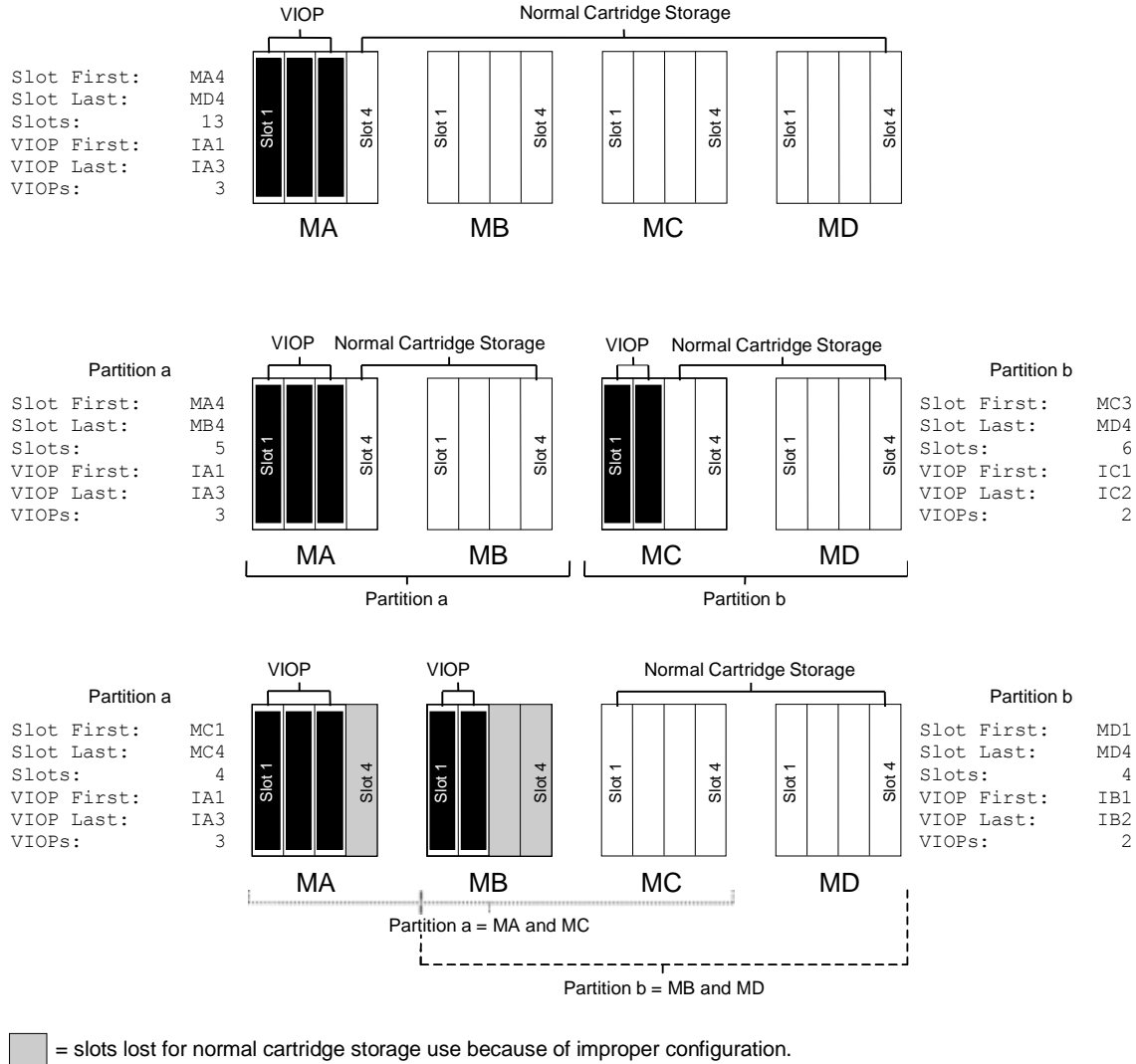
Figure 8-3   Examples of VIOP Slot Assignments

8.15.14 DT Serial

This value determines if the tape drive serial numbers are reported to the SCSI host as part of the Data Transfer Element Descriptor. Refer to the RLS SCSI-2 Interface Reference (Qualstar document number 501551) for details.

8.15.15 Inquiry

Inquiry is the SCSI Inquiry string returned by the RLS to its host computer. The NATIVE values is the standard Qualstar Inquiry string (model dependent). Editing the inquiry string will cause the Inquiry value to change to CUSTOM. Changing the value from CUSTOM back to NATIVE results in the loss of the custom string. See `Configuration\Advanced\Library\?\Inquiry` (Section 8.15.18) for programming a custom inquiry string.

Inquiry (`Inq`) is a multiple-choice value with the options listed below (`NATIVE` is the default value):

    NATIVE, CUSTOM

The default inquiry strings are model dependent: "RLS-8202-12", "RLS-8202-20", "RLS-8202-28", "RLS-8202-36", "RLS-8202D-12", "RLS-8202D-20", "RLS-8202D-28", "RLS-8202D-36", "RLS-8204-12", "RLS-8204-20", "RLS-8204-28", "RLS-8204-36", "RLS-8204-44", "RLS-8204D-12", "RLS-8204D-20", "RLS-8204D-28", "RLS-8204D-36", "RLS-8204D-44", "RLS-8216C", "RLS-8216CD", "RLS-8236C", "RLS-8236CD", "RLS-8236", "RLS-8236D", "RLS-8244", "RLS-8244D", "RLS-8444", "RLS-8444D"

8.15.16 Storage Order (Model 4221 only)

Magazine and Fixed slots are lumped together as one contiguous array of storage elements in the SCSI Storage Element Type. This item determines which order the magazine and fixed slots are assigned addresses and subsequently reported to the SCSI host.

`Storage Order` is a multiple-choice value with the options listed below:

MAG	Magazine element addresses are assigned and reported before Fixed element addresses (default value).
FIX	Fixed element addresses are assigned and reported before Magazine element addresses. This value is required to emulate other tape libraries.

8.15.17 Volume Tag Pad

The changer maintains an internal inventory database which, when equipped with a barcode reader, contains the barcode data referred to in the SCSI specification as the Volume Tag. The SCSI specification requires the 32-byte Volume Identifier data field of the Volume Tag to be left justified and padded with spaces. Some other equipment manufacturers do not adhere to this specification and pad the field with NULS (Hex 00). In order to provide emulation capabilities for these units, the `Volume Tag Pad` value allows selecting for this partition between the two pad characters as follows:

SPC   This value pads the Volume Identifiers with the SCSI standard space character. This is the default value.

00   This value pads the Volume Identifiers with the non-standard NUL character (hex 00).

8.15.18 Configuration\Advanced\Library\?\Inquiry

```
CAL•? •••••••Inquiry
Inquiry:     NATIVE
   xxxxxxxxxxxxxxx
            ???????
   ???????????????
             ????
   xxxxxxxxxxxxxxx
   xxxxxxxxxxxxxxx
         xxxxxxxx
```

Field Name	Data Format	Bytes
Device Specific	Hexadecimal	8
Vendor ID	Alphanumeric	8
Product ID	Alphanumeric	16
Revision	Alphanumeric	4
Vendor Unique	Hexadecimal	20

Figure 8-4   Inquiry String Contents

NOTE

All items in this menu except Inquiry are locked by the Door Lock, Configuration Lock and the Master Lock See Section 8.1.

Below the `Inquiry:` value are the 5 data fields that comprise the SCSI Inquiry string reported to a host computer. If implemented, each logical library can have the same Inquiry String as all others or it may be completely unique. There is one of these menu screens for each enabled logical library as determined by the "?" (a…d) in the top menu line.

The `Inquiry:` item has two possible values: `NATIVE` and `CUSTOM`. When the `Inquiry:` value indicates `NATIVE`, all 5 fields of the Inquiry String are set to the default value for the particular RLS model. When the `Inquiry:` item is first set to `CUSTOM`, the Inquiry String is still equal to the `NATIVE` value. If any of the Inquiry String fields are edited, the `Inquiry:` value is automatically set to `CUSTOM`.

Changing the Inquiry String's value only affects the string reported to the host computer – it does not affect the operation of the RLS. To change to a new CUSTOM Inquiry String, simple edit the desired fields as required. When the editing is done, simple press EXIT or MENU to leave this menu. The new Inquiry String is specific to the indicated logical library (usually "a"). It may be changed back to the factory default value by simply changing the `Inquiry:` value to `NATIVE`.

The five fields that make up the SCSI Inquiry data file are described in detail in the RLS SCSI-2 Interface Reference (Qualstar document number 501551). Below is a brief description of each field.

Device-Specific	These eight bytes of hexadecimal data are device-specific. Edit these bytes with care to maintain the compatibility of the device with SCSI systems.
Vendor ID	These eight bytes of data are normally used to identify the equipment vendor.
Product ID	These sixteen bytes of data are normally used to describe the product by name, model, etc.
Product Revision	These four bytes of data are normally used to indicate the firmware revision level of the RLS.
Vendor-Specific	These twenty bytes of hexadecimal data are vendor-specific. Note this one field comprises the last three lines of the display.

8.16   Configuration\Advanced\Library\Element Address Menu

```
CAL•?•ElementAddress
 Display:     SAVED
 Data Transfr:ddddd
 Imp/Export:  ddddd
 Medium Trans:ddddd
 Storage:     ddddd
```

NOTE

All items in this menu except Display are locked by the Configuration Lock and the Master Lock. See Section 8.1.

This menu contains the starting SCSI element addresses for the four major element types of a SCSI Medium-changer: Data Transfer, Import Export, Medium Transport, and Storage. Those addresses apply only to this logical library partition.

The Default Element Addresses as shown in the table below. Duplicate element addresses can exist in other logical libraries. For a detailed list of Default Element Addresses, see Table 7-1.

Menu Item	SCSI Element Type	Assigned to Logical Library Location	Default Element Address
Storage:	Storage Element	First Storage Slot	0
Data Transfr:	Data Transfer Element	First Drive	63000
Imp/Export:	Import/Export Element	VIOP	64000
Medium Tran:	Medium Transport Element	Handler	65000

Table 8-3 Default Element Addresses

The number of each element type varies with the logical library configuration. The element address values are decimal, with a range of from zero to 65,535, and leading zeroes are suppressed in the display. See the RLS SCSI-2 Interface Manual for additional information on element addresses.

NOTE

With only the a: logical library enabled, Drive T2 has an element address of 63001. If T2 is partitioned to b, c or d then it will be the First Drive of that library and will be assigned Data Transfer Element Address 63000.

8.16.1 Configuration\Advanced\Library\ElementAddress\Display

There are two sets of element addresses. They are selectable in the menu and function as follows:

SAVED This set of element addresses stored in non-volatile memory. The SAVED set is the set that will be in use following a Reset event. A Reset event can be caused by any one of the following three conditions:

- When the RLS Power is turned On.

- When a SCSI Bus Reset occurs (hardware reset).

- When a SCSI Bus Device Reset Message is directed to the changer by the host.

DEFAULT This is the set of uneditable factory-specified element addresses. The DEFAULT set may be copied to the SAVED set (stored in non-volatile memory).

The SCSI-2 specification allows the host to read the values of the two sets of element addresses: SAVED and DEFAULT. The SCSI-2 specification also allows the host to modify the values of the SAVED set.

In addition, the CAL·?·ElementAddress menu can be used to manually edit the SAVED files. The DEFAULT files can also be copied to the SAVED file.

The COPY TO SAVED functions appear dynamically, depending upon the set being displayed or edited. For example, if the DEFAULT set is displayed, the COPY TO SAVED function appears.

8.17   Configuration\Advanced\Log Menu

```
C•Advanced•••••••Log
 BDC:           OFF
 Carousel:      OFF
 Carrier:       OFF
 Clean:          ON
 Configuration:  ON
 Contend:       OFF
 Control:       OFF
 DriveBay:      OFF
 FC Events:     OFF
 FC Replies:    OFF
 FC States:     OFF
 I2c:           OFF
 Inventory:     OFF
 Pic:           OFF
 Process:       OFF
 RBT Actions:    ON
 RBT Activity:   ON
 RBT Events:     ON
 RBT Isr:       OFF
 RBT Job:       OFF
 RBT Operation: OFF
 RBT Results:    ON
 SCSI Commands:  ON
 SCSI Interrupt: ON
 SCSI Phases:    ON
 SCSI States:    ON
 Sensor:        OFF
 Sequential:     ON
 Storage Array: OFF
```

NOTE

All items in this menu are locked by the Configuration Lock and the Master Lock. See Section 8.1.

The changer maintains a log that consists of a list of internal events. This menu determines which events are logged. The purpose of the log is to assist in testing and isolating problems with the assistance of Qualstar support personnel.

Each item in the Configuration\Log menu has two choices:

ON   Logging of the individual menu item enabled.

OFF   Logging of the individual menu item disabled.

The log is limited to a fixed amount of memory. Log items can be individually disabled by selecting OFF to provide more memory for the ON log items. The default values are show above. RBT in this menu stands for ROBOT or the robotics handling mechanism.

8.18   Configuration\Advanced\SCSI Menu

```
C•Advanced••••••SCSI
 •Library
 Disconnect:      ON
 Enable:          ON
 LUN:              0
 Parity:       ABORT
 Synchronous:    OFF
 Term Power:      ON
```

NOTE

All items in this menu except for LUN are locked by the Configuration Lock and the Master Lock. See Section 8.1.

This menu allows configuring the Medium-changer to match the system's SCSI requirements.

8.18.1   Disconnect

This value determines whether the Medium-changer will be allowed to disconnect from the SCSI bus during a SCSI command. Disconnects can improve SCSI bus performance when multiple devices are being accessed.

Disconnect is a multiple-choice value with the options listed below:

ON   The Medium-changer is allowed to disconnect, as long as a disconnect is permitted by the host (default value).

OFF   The Medium-changer will not disconnect under any circumstances.

8.18.2   Enable

This value controls whether the Medium-changer will respond to an assigned SCSI Initiator (host system). If the changer is set to respond to an initiator, the Enable value also controls the nature of the changer's response.

During normal operation, the Enable value should always be set to ON for a Medium-changer operating under host control. However, it may sometimes become desirable to take the Medium-changer off-line, for test or demonstration purposes, or when the changer is used strictly in the Sequential mode (see *CAUTION* note below).

The Enable is a multiple-choice value with the options listed below:

BUSY   The Medium-changer responds to any SCSI command with a status of BUSY and the command is not executed.

INFO ONLY	The Medium-changer responds to all SCSI commands, except INQUIRY and REQUEST SENSE, with a status of BUSY (see BUSY above). INQUIRY and REQUEST SENSE commands execute normally.
	In particular, note that TEST UNIT READY will respond with a status of BUSY.
OFF	The Medium-changer does not respond to the SCSI selection process or to the SCSI bus RESET command (as if the unit was not connected to the SCSI bus).
ON	Select this option for normal operation (default value).

CAUTION

> *Some host systems may lock up the SCSI bus if the BUSY or INFO ONLY SCSI Enable value is selected. If this occurs, change the SCSI Enable value to OFF or ON only.*

8.18.3   LUN

NOTE

> *LUN is locked by the Door Lock, the Configuration Lock and the Master Lock.*
> *See Section 8.1.*

This value assigns a Logical Unit Number (LUN) to the Medium-changer:
`0, 1, 2, 3, 4, 5, 6, 7, or ANY.`
The `ANY` value means that the Medium-changer will respond to any LUN. The default value is 0.

8.18.4   Parity

This value determines what action the Medium-changer will take when it detects a parity error on the SCSI bus during a Command Out, Data Out, Status Out, or Message Out phase.

`Parity` is a multiple-choice value with the options listed below:

MESSAGE	Use this option if the host adapter supports messages involving parity errors detected during one of the Out phases. If the LUN is known and a parity error is detected, the Medium-changer will perform a retry sequence before aborting the command.
ABORT	Use this option if the host adapter does not support messages involving parity errors detected during one of the Out phases. The Medium-changer will abort the command without performing the retry sequence (default value).

IGNORE	The Medium-changer will accept the data and will not notify the initiator that it detected a parity error.

8.18.5 Synchronous

This value is used to enable synchronous data transfer during any data out phase. The factory default is `OFF` to allow the Medium-changer to operate with the majority of systems when first installed. Asynchronous is slightly slower than synchronous.

`Synchronous` is a multiple-choice value with the options listed below:

ON	Places the Medium-changer in the Synchronous mode. The Synchronous mode is slightly faster than the Asynchronous mode.
OFF	Places the Medium-changer in the Asynchronous mode.

8.18.6 Term Power

This value controls the SCSI termination power for the Medium-changer Port.

`Term Power` is a multiple-choice value with the options listed below:

ON	The RLS provides Termination Power to the SCSI connectors on its Interface Personality Module (IPM)
OFF	No Termination Power is supplied by the RLS to the SCSI connectors on its Interface Personality Module (IPM)

8.19   Configuration\Advanced\SCSI\Library Menu

```
CA•SCSI•••••Library
 Initiator 0:     a
 Initiator 1:     a
 Initiator 2:     a
 Initiator 3:     a
 Initiator 4:     a
 Initiator 5:     a
 Initiator 6:     a
 Initiator 7:     a
 Initiator 8:     a
 Initiator 9:     a
 Initiator 10:    a
 Initiator 11:    a
 Initiator 12:    a
 Initiator 13:    a
 Initiator 14:    a
 Initiator 15:    a
```

NOTE

All items in this menu are locked by the Door Lock, the Configuration Lock and the Master Lock. See Section 8.1.

This menu is used to determine which initiators (host computers) each logical library will respond to. A logical library (a …d) can respond to as many as 15 initiators. The menu lists the 16 SCSI ID's of possible initiators and the logical library that will respond to that SCSI ID. The default setting is that Library-a responds to every SCSI initiator on the bus. It doesn't matter that a logical library is told to respond to a SCSI ID that doesn't exist or belongs to another target such as a tape drive or even to itself. It becomes evident when looking at this menu that any initiator can control only one logical library, but each logical library can respond to more than one initiator.

8.19.1   Initiator ID

The value of each SCSI ID is the letter of a logical library that will respond to its commands. Determine which initiators a given logical library is to respond to and then change the value for each Initiator ID to that letter.

8.20   Configuration\Drive Menu

```
Configuration••Drive
•T1: DISABLED    9
•T2: RANDOM      10
•T3: 1A01  10    11
•T4:         NONE
```

The Configuration\Drive menu has up to four sub-menus – one for each tape drive position. The sub-menus are T1, T2, etc. Following the tape drive number is a summary report of the settings for that drive as determined in the drive's sub-menu. There are several types of summary reports as shown in Table 8-4 below. Refer to Chapter 10 for an explanation of the Random, Sequential, Recycle and Dual-Bin modes. To see the actual details of a drive's configuration, press the ENTER key to descend into its sub-menu. That is where the configuration can be changed.

Drive State	Menu Format	Description
Not Installed	`T4:          NONE`	The drive carrier is not installed.
Installed but Disabled	`T1: Disabled    9`	Drive T1 is disabled at SCSI ID 9. The drive is treated by the Medium-changer as though it were not installed.
Random Mode	`T2: RANDOM     10`	Drive T2 is in the Random Mode at SCSI ID 10.
Sequential Mode	`T3: MA1   10   11`	Drive T3 is in the Sequential Mode at SCSI ID 11. 10 Magazine slots are allocated to this drive beginning at slot `MA1`.
Recycle Mode	`T4: MA1   20+  12`	Drive T4 is in the Recycle Mode (+) at SCSI ID 12. 20 Magazine slots are allocated to this drive beginning at slot `MA1`.
Dual-Bin Mode	`T4: MC1   10+  15`	Drive T4 is in the Dual-Bin Mode (+) at SCSI ID 15. 10 Magazine slots are allocated to this drive beginning at slot `MC1`.

Table 8-4   Tape Drive Status Summary

8.21 Configuration\Drive\T? Menu

```
C•Drive••••••••••T?
 Mdl: ?????????????
 SN  ?????????????
 Enabled:       YES
 SCSI Bus:  CHANGER
 SCSI Id:        dd
 Term Power:    OFF
 Clean Loc:  llllll
 POWER CYCLE
 Eject:        HOST
 Mode:       RANDOM
 Start:      MANUAL
 Input First:llllll
 Input Last: llllll
 Input Slots:   ddd
 OutputFirst:llllll
 OutputLast: llllll
 OutputSlots:   ddd
```

NOTE

Except as noted below, all items in this menu are locked by the Door Lock, Configuration Lock and the Master Lock. See Section 8.1.

The `Configuration\Drive\T?` menu is used to configure the changer for each tape drive. It can also specify a location for a cleaning cartridge to be used when executing the `CLEAN DRIVE` command in the `Operations` menu. The Random, Sequential, Recycle or Dual-Bin mode, for each tape drive, is also determined along with the cartridge location parameters for the Sequential, Recycle or Dual-Bin modes. All parameters specified in this menu refer to only the tape drive number indicated in the upper right corner of the menu.

8.21.1 Mdl

`Mdl` is an abbreviation for Model. The model value indicates the model of the tape drive installed at the indicated location as determined by the RLS during the power-up sequence.

8.21.2 SN

`SN` indicates the Serial Number read from the indicated tape drive.

8.21.3   Enabled

YES   The drive is considered ready to be loaded.

NO   The drive is considered inoperable and is marked as Drive Not Present in the SCSI Read Element Status data. A cartridge cannot be moved to or from a disabled drive.

8.21.4   SCSI Bus

NOTE

The SCSI Bus menu item is not security locked.

This value indicates to which SCSI bus the tape drive is connected. This value is reported to the SCSI host computer as an element descriptor. Its value does not affect the operation of the Medium-changer.

RLS models are equipped with separate SCSI bus connections for the tape drives. This affects the reporting of Data Transfer Element Descriptors to the host computer, since some or all of the tape drives may reside on a different SCSI bus than the Medium-changer.

There is a multiple-choice value with the following options:

CHANGER   Indicates the tape drive is connected to the same SCSI bus as the Medium-changer (standard configuration, default value).

OTHER   Indicates the tape drive is connected to a different SCSI bus than the Medium-changer (optional configuration).

INVALID   It does not matter which SCSI bus the tape drive is connected to; the changer will report its SCSI ID information as *Invalid*.

8.21.5   SCSI ID

NOTE

SCSI is locked only by the Configuration Lock and the Master Lock. See Section 8.1.

This value determines the SCSI ID of the tape drive. The changer reports the SCSI ID's of all Random mode tape drives to the host computer upon request, but does not otherwise make use of the value.

Values range from 0 to 15. The default values are 1 through 4 for tape drives T1 through T4 respectively.

Changing the SCSI ID of a tape drive via the menu system causes the RLS to change the state of signals connected to the tape drive. However, the tape drive only checks these signals when power is applied or following a SCSI bus reset. Therefore, the SCSI ID's of the tape drives will not immediately change after setting them.

To cycle the power of an individual tape drive, execute the POWER CYCLE command in the Configuration\Drive\T? menu. This will allow the drive to change to its new SCSI ID.

NOTE

When tape drives are attached to the same SCSI bus as the Medium-changer, each drive must be assigned a SCSI ID that has not been assigned to the Medium-changer, any hosts, another drive, or any other device connected to the SCSI bus. The changer does not check for this - it is the operator's responsibility to avoid conflicts.

*When tape drives are attached to separate SCSI busses, duplicate SCSI ID numbers are permitted from bus to bus. However, **no two devices on the same SCSI bus may have the same SCSI ID number**. This of course depends upon the system configuration.*

8.21.6 Term Power

NOTE

Term Power is locked only by the Configuration Lock and the Master Lock. See Section 8.1.

This value controls the SCSI termination power for the Tape Drive port.

Term Power is a multiple-choice value with the options listed below:

ON   The RLS provides Termination Power to the SCSI connectors for this tape drive.

OFF   No Termination Power is supplied by the RLS to the SCSI connectors for this tape drive.

8.21.7 WWN

This value is an abbreviation for World Wide Node Name and will only appear when DFA (Direct Fibre Attach) tape drives are installed in the library. The WWN value indicates the unique hardware address of the tape drive that is used when communicating in a network environment and it is not editable.

8.21.8 Clean Loc

The setting of this value is optional. If one or more cleaning cartridges will be installed in the RLS, then this value should be set to the location of the cleaning cartridge to be used for cleaning this tape drive. Cleaning cartridges may be shared between tape drives by being specified for more than one drive, or dedicated to individual drives by being specified for only one drive.

The value may be set to any magazine or fixed storage location. If no cleaning cartridge location is to be specified for this tape drive, the value should be set to "....." (five periods). To set the value to ".....", move the cursor to the third column and then use the Up arrow key until "....." is displayed.

When this tape drive (upper right corner of this menu) is selected from the `Operations\Clean Drive` menu, the changer will go to this location to fetch the cleaning cartridge.

8.21.9 Eject

This item determines the RLS' response to a SCSI Move Medium command when the *from* location is a tape drive with its tape still inside the drive.

`Eject` is a multiple-choice value with the options listed below:

HOST   The HOST's command immediately terminates in a failure.

BOTH   The changer sends an eject command to the drive through its serial interface and moves the tape once it's ejected.

8.21.10 POWER CYCLE Command

This command will cycle the power of the tape drive off and back on. This will reset the drive and allow it to update its SCSI ID if it was changed in this menu. DO NOT execute this command if there is a tape cartridge in the drive as it could be damaged.

8.21.11 Mode

Each installed tape drive in the RLS will be in one of four modes: Random, Sequential, Recycle or Dual-Bin. Briefly, in the Random mode, the tape drive is available within a library to the host computer as a source/destination location for cartridge movements. In the Sequential, Recycle and Dual-Bin modes, the host cannot cause cartridge movements to or from the tape drive. See Chapter 10 for a complete description of the Sequential, Recycle and Dual-Bin modes of operation.

RANDOM	The tape drive is available for normal library cartridge movement operations to and from the drive under host computer control. The drive and cartridges must be within an enabled logical library.
	The remaining parameters below the Mode value in this menu are not used during Random mode operations, but are used during Sequential mode operations.
SEQUENTIAL	The tape drive is dedicated to receiving cartridges under changer control. The changer will reject host-requested cartridge movements to this device.
RECYCLE	The Recycle mode shares the attributes of the Sequential mode. It has the additional feature of automatically restarting the cartridge movement cycle after the last cartridge in the drive's location range has been returned.
DUAL-BIN	The tape drive is dedicated to receiving cartridges under changer control. The changer will reject host-requested cartridge movements to this device. This mode is similar to Sequential except the source and destination cartridge locations are separate and distinct.

8.21.12 Start

The Start value allows a tape drive that is configured for one of the three sequential modes to automatically start at power-on or after an inventory violation has stopped the library when set for INVENTORY or POWER-ON. Any tape drives configured for the Random mode will ignore the Start value.

The Start value has three possible settings:

MANUAL
If a cartridge is in the tape drive at power-on, the library stops and waits for the operator to either manually eject the cartridge or call upon the host system to eject it. After the cartridge is ejected it must be moved back to the location it came from. The sequential operation can then be restarted by manually invoking the START command.

If a cartridge is in the tape drive after a library has stopped because of an inventory violation, the library attempts to continue from where it left off.

INVENTORY
If a cartridge is in the tape drive at power-on or after an inventory violation, the previous input and output slots are invalidated. If after the library completes an inventory scan and finds the input and output slots are both valid, the library attempts to continue from where it left off. If the input and output slots are both invalid, the library will search at the beginning of the range for the first empty slot. It will then restart using the next tape that was found after the first empty slot in the input range. In any other case the library will stop.

POWER-ON
This mode behaves like INVENTORY, but it only starts the library at power-on.

8.21.13 Input First

The Input First value determines the first magazine cartridge location allocated for Sequential or Recycle operation for this tape drive. For Dual-Bin operation this value determines the first magazine cartridge location for the Input range. See Chapter 10.

8.21.14 Input Last

The Input Last value determines the last magazine cartridge location allocated for Sequential or Recycle operation for this tape drive. For Dual-Bin operation this value determines the last magazine cartridge location for the Input range. See Chapter 10.

8.21.15 Input Slots

The Input Slots value indicates the number of magazine cartridge locations allocated for Sequential or Recycle operation for this tape drive. For Dual-Bin operation this value indicates the number of input magazine cartridge locations allocated. This value is not editable.

8.21.16 OutputFirst

The Output First value determines the first magazine cartridge location for the Output range allocated for Dual-Bin operation for this tape drive. See Chapter 10.

8.21.17 OutputLast

The Output Last value determines the last magazine cartridge location for the Output range allocated for Dual-Bin operation for this tape drive. See Chapter 10.

8.21.18 OutputSlots

This value indicates the number of output magazine cartridge locations allocated for Dual-Bin operation for this tape drive. This value is not editable.

8.22   Configuration\Fibre Channel Menu

```
C••••••Fibre Channel
 •Device
 Id Mode  0:     SOFT
 Loop Id  0:      nnn
 Topology 0:     LOOP
```

NOTE

All items in this menu are locked by the Configuration Lock and the Master Lock. See Section 8.1.

8.22.1   Id Mode

This value represents the Id Mode, which must be configured for either "Soft" or "Fixed" addressing. Using "Soft" addressing, the Fibre Channel Bridge connects to an arbitrated loop using the first available AL_PA, scanning from the highest valid address to the lowest. Using "Fixed" addressing; the user selects a specific arbitrated loop address (AL_PA) to connect with. If the selected address is not available, the Fibre Channel Bridge will connect with the first available address it finds

  FIXED   The "Loop Id" entry is displayed.

  SOFT   The Loop Id is automatically assigned by the Fibre Channel loop insertion protocol.

8.22.2　Loop Id

During the Fibre Channel Arbitrated Loop (FC-AL) initialization process, a unique Arbitrated Loop Physical Address (AL_PA) value is assigned to each port on the loop. Not all of the 256 hex values are allowed as AL_PA values per FC-AL. The Loop Id value is used to represent the 126 addresses that the Fibre Channel Bridge can use.

Table 8-5 shows how a Loop Id value maps to an AL_PA. If "SOFT" is requested for the "Loop Id", the Fibre Channel Bridge will attempt to obtain an available Loop Id, in the following order: 0, 1, 2, etc.

8.22.3　Topology

This value sets the Fibre Channel Bridge host topology. The "Topology" has two selections, LOOP and FABRIC. The LOOP selection configures the Fibre Channel Bridge for Arbitrated Loop (FC-AL) operation. The FABRIC selection configures the Fibre Channel Bridge for Switch Fabric (FC_SW) operation. If the mode is LOOP, the `Id Mode` and `Loop Id` entries are available.

LOOP　　The LOOP value configures the Fibre Channel Bridge for Arbitrated LOOP (FC-AL) operation.

FABRIC　　The FABRIC value configures the Fibre Channel Bridge for Switch Fabric (FC_SW) operation.

Loop Id	AL_PA	Loop Id	AL_PA	Loop Id	AL_PA	Loop Id	AL_PA
(decimal)	(hex)	(decimal)	(hex)	(decimal)	(hex)	(decimal)	(hex)
0	EF	32	B2	64	72	96	3A
1	E8	33	B1	65	71	97	39
2	E4	34	AE	66	6E	98	36
3	E2	35	AD	67	6D	99	35
4	E1	36	AC	68	6C	100	34
5	E0	37	AB	69	6B	101	33
6	DC	38	AA	70	6A	102	32
7	DA	39	A9	71	69	103	31
8	D9	40	A7	72	67	104	2E
9	D6	41	A6	73	66	105	2D
10	D5	42	A5	74	65	106	2C
11	D4	43	A3	75	63	107	2B
12	D3	44	9F	76	5C	108	2A
13	D2	45	9E	77	5A	109	29
14	D1	46	9D	78	59	110	27
15	CE	47	9B	79	56	111	26
16	CD	48	98	80	55	112	25
17	CC	49	97	81	54	113	23
18	CB	50	90	82	53	114	1F
19	CA	51	8F	83	52	115	1E
20	C9	52	88	84	51	116	1D
21	C7	53	84	85	4E	117	1B
22	C6	54	82	86	4D	118	18
23	C5	55	81	87	4C	119	17
24	C3	56	80	88	4B	120	10
25	BC	57	7C	89	4A	121	0F
26	BA	58	7A	90	49	122	08
27	B9	59	79	91	47	123	04
28	B6	60	76	92	46	124	02
29	B5	61	75	93	45	125	01
30	B4	62	74	94	43		
31	B3	63	73	95	3C		

Table 8-5 Arbitrated Loop Physical Addresses

8.23 Configuration\Fibre Channel\Device Menu

```
C••••••Fibre Channel
•0:  ?????????????
•1:  ?????????????
•2:  ?????????????
•3:  ?????????????
•4:  ?????????????
•5:  ?????????????
•6:  ?????????????
•7:  ?????????????
•8:  ?????????????
•9:  ?????????????
•10:?????????????
•11:?????????????
•12:?????????????
•13:?????????????
•14:?????????????
•15:?????????????
•16:?????????????
•17:?????????????
RESCAN
```

The `Configuration\Fibre Channel\Device` menu displays a listing of the SCSI devices attached to the Fibre Channel Bridge. This menu presents a list of the first 16 LUN assignments.

8.23.1 RESCAN

NOTE

The RESCAN command is locked by the Configuration Lock and the Master Lock. See Section 8.1.

Invoking this command will cause the Fibre Channel Bridge to rescan the buses for SCSI devices. Note, the RESCAN command will disrupt host communication, so a warning message will be displayed. When the warning message appears, press the ENTER key to continue the RESCAN operation.

CAUTION

The RESCAN operation should be performed with the Library disconnected from the host. The Fibre Channel Bridge is restarted and SCSI device address maybe modified.

8.24 Configuration\Fibre Channel\Device ?? Menu

```
CFC Device••••••••??
 SCSI Channel:     d
 SCSI Id:         dd
 SCSI Lun          d
 Manuf:????????????
 Model:????????????
```

The `Configuration\Fibre Channel\Device ?` menu displays information that the Fibre Channel Bridge has obtained from the selected SCSI device.

8.24.1 SCSI Channel

This value is the Fibre Channel Bridge SCSI channel (0-1) that the device is connected to.

8.24.2 SCSI ID

This value is the SCSI Id of the device.

8.24.3 SCSI Lun

This value is the SCSI Lun of the device.

8.24.4 Manuf

This value is the SCSI device manufacturer's string.

8.24.5 Model

This value is the SCSI device model string.

8.25   Configuration\Q-Link Menu

If the RLS library and Q-Link module are operational, these default address values
will be displayed.

```
C••••••••••••••Q-Link
>Ip:192.168.0.2
 Ma:255.255.255.0
 Gw:0.0.0.0
 Use DHCP:      OFF
 Link Status:    UP
 MAC:   xxxxxxxxxxxx
 Date:   mm/dd/yyyy
 Part Number:700xxx
 Revision:     d.d.d
 Checksum: xxxxxxxx
 RESET
 SET ADDRESSES
 DEL ADMIN PASSKEY
```

NOTE

All items in this menu are locked by the Configuration Lock and the Master Lock. See Section 8.1.

The `Configuration\Q-Link` menu displays the network address information
obtained from the Q-Link module.

8.25.1   Ip

This value is Q-Link's current IP address. When the `Use DHCP` value is set to `ON`,
this value is supplied via DHCP. When `Use DHCP` is `OFF`, the IP address may be
manually edited.

8.25.2   Ma

This value is Q-Link IP mask. When the `Use DHCP` value is set to `ON`, this value is
supplied via DHCP. When `Use DHCP` is `OFF`, the IP mask may be manually edited.

8.25.3   Gw

This value is the IP address of Q-Link network gateway. When the `Use DHCP` value
is set to `ON`, this value is supplied via DHCP. When `Use DHCP` is `OFF`, the gateway
IP address may be manually edited.

8.25.4   Use DHCP

This option enables the Q-Link network interface to use DHCP to obtain its network address
values. If `Use DHCP` is set to `YES`, the `Ip`, and `Ma` and `Gw` fields cannot be edited.

8.25.5 Link Status

The `Link Status` value indicates the condition of the network connection to Q-Link.

UP   The network connection is attached to Q-Link and active.

DOWN   There is no network connection attached to Q-link or a non-active connection is attached.

8.25.6 MAC

The `MAC` (media access control) value indicates the unique hardware address of Q-Link that is used when communicating in a network environment.

8.25.7 Date

This is the date that the Q-Link firmware version installed in the RLS was created.

8.25.8 Part Number

This is the part number of the Q-Link firmware installed in the RLS.

8.25.9 Revision

This is the Revision number of the Q-Link firmware installed in the RLS.

8.25.10 Checksum

This is the Checksum number of the Q-Link firmware installed in the RLS.

8.25.11 RESET

Executing this command performs a software reset of the Q-Link firmware. All existing data settings in the firmware will disappear and be replaced when new values become available.

8.25.12 SET ADDRESSES

This command sets the Q-Link network values edited above. The `SET ADDRESSES` command only appears if an address field has been edited.

8.25.13 DEL ADMIN PASSKEY

Executing this command restores the default User 1 (Admin) Passcode (user name and password). The `DEL ADMIN PASSKEY` command only appears when `update` access is valid and requires that the `Configuration` and `Master` security locks must be set to `OFF`.

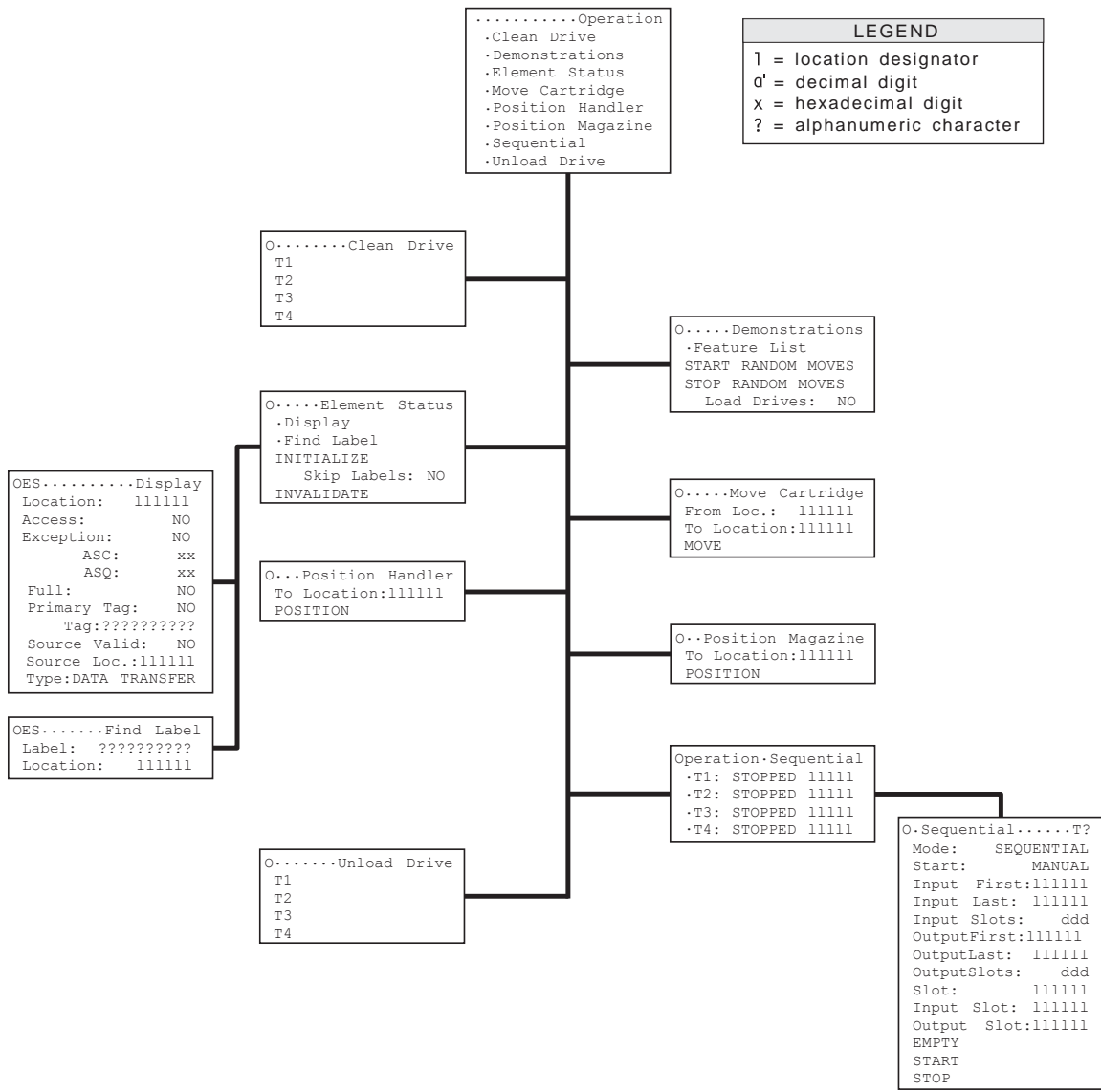# 9.   The Operation Menu

```
..........Operation
·Clean Drive
·Demonstrations
·Element Status
·Move Cartridge
·Position Handler
·Position Magazine
·Sequential
·Unload Drive
```

```
┌─────────────────────────┐
│          LEGEND          │
├─────────────────────────┤
│ l = location designator  │
│ d'= decimal digit        │
│ x = hexadecimal digit    │
│ ? = alphanumeric character│
└─────────────────────────┘
```

```
O·········Clean Drive
 T1
 T2
 T3
 T4
```

```
O·····Demonstrations
 ·Feature List
 START RANDOM MOVES
 STOP RANDOM MOVES
   Load Drives:  NO
```

```
O·····Element Status
 ·Display
 ·Find Label
 INITIALIZE
    Skip Labels: NO
 INVALIDATE
```

```
O·····Move Cartridge
 From Loc.:  llllll
 To Location:llllll
 MOVE
```

```
OES·········Display
 Location:   llllll
 Access:        NO
 Exception:     NO
       ASC:     xx
       ASQ:     xx
 Full:          NO
 Primary Tag:   NO
     Tag:??????????
 Source Valid:  NO
 Source Loc.:llllll
 Type:DATA TRANSFER
```

```
O···Position Handler
 To Location:llllll
 POSITION
```

```
O··Position Magazine
 To Location:llllll
 POSITION
```

```
OES·······Find Label
 Label:  ??????????
 Location:   llllll
```

```
Operation·Sequential
 ·T1: STOPPED lllll
 ·T2: STOPPED lllll
 ·T3: STOPPED lllll
 ·T4: STOPPED lllll
```

```
O·Sequential······T?
 Mode:    SEQUENTIAL
 Start:      MANUAL
 Input First:llllll
 Input Last: llllll
 Input Slots:   ddd
 OutputFirst:llllll
 OutputLast: llllll
 OutputSlots:   ddd
 Slot:       llllll
 Input Slot: llllll
 Output  Slot:llllll
 EMPTY
 START
 STOP
```

```
O·······Unload Drive
 T1
 T2
 T3
 T4
```

Figure 9-1   The Operation Menu Structure

The `Operation` menu provides the operator with the commands needed to *use* the library. It contains commands to: move cartridges, clean tape drives, find labels, and control the Sequential mode of accessing cartridges. It also provides a `Random Moves` feature that can be used to test the RLS robotics and commands to position the handler and carousel or storage array.

9.1 Introduction

Be sure to read the menu system and Configuration Menu chapters before proceeding with this chapter.

The `Operation` menu and its sub-menus are used for the following purposes:

- Control of Sequential operation (unattended backup with multiple tape cartridges per tape drive).

- Manually moving or exchanging cartridges within the RLS using the handler (with the door locked).

- Positioning the Handler to a specific location or parking the changer's carriage (with the door locked).

- Querying the changer for details on the inventory database, including barcode label data.

- Invalidating or initializing the inventory database.

The Legend in Figure 9-1 indicates the types of values found in the value items of the sub-menus of the `Operation menu`. An explanation of each type is given below.

Legend	Explanation
d	**Decimal** digit (0-9):
	A Decimal value contains one or more decimal digits, indicating the present value of the item. Example:
	Element address (sometimes abbreviated **Elem**.):
	This value is the address used by the SCSI host to select a system element. Address values range from 0 to 65535.
l	**Location Designators**:
	This value describes the physical location of a cartridge, tape drive, etc. See Section 6.6.3
x	**Hexadecimal** digit (0-9, A-F):
	A hexadecimal value contains one or more hexadecimal digits, indicating the present value of the item.
?	**Alphanumeric** character:
	An alphanumeric value contains one or more alphanumeric characters, indicating the present value of the item.

Table 9-1   Legend of Operation Menu's Digits

9.2　Operation Menu

```
••••••••••Operation
•Clean Drive
•Demonstrations
•Element Status
•Move Cartridge
•Position Handler
•Position Magazine
•Sequential
•Unload Drive
```

The `Operation` menu contains a list of sub-menus. Most of the sub-menus contain commands, many of which simulate SCSI-2 commands. SCSI-2 commands are described in the RLS SCSI-2 Interface Reference (Qualstar document number 501551).

All storage locations displayed in the menus contain the `Location` value. The `Location` value is the element's physical location designator. This value is an index into the inventory database.

The physical `Location` value (MA3, MD5, etc.) can be edited. The values are displayed to indicate the relationship between the logical locations of the host software and the physical locations of the changer. The address assignments are not being edited. Only the index into the inventory database is being edited.

The following sections explain each sub-menu of the `Operation` menu in detail. Each section header uses one or more backslashes (\) to show the path from the `Operation` menu down to the section's sub-menu.

9.3　Operation\Clean Drive Menu

```
O••••••••Clean Drive
 T1
 T2
 T3
 T4
```

This menu is used to manually initiate the automatic insertion of a cleaning cartridge into a tape drive. After the tape drive has been cleaned, and it has ejected the cleaning cartridge, the cleaning cartridge is automatically returned to its original location.

During the configuration of the changer, it was possible to indicate a magazine or fixed cartridge location, for each tape drive, where a cleaning cartridge was located (see the `Configuration\Drive\T?` menu). If *all* of the following conditions are met for any tape drive, then that drive's number will appear in the menu:

- A cleaning cartridge location was specified in the `Configuration\Drive\T?` menu

- A cartridge is present in the specified location

- The tape drive is currently empty

- The tape drive model (Mdl) is not configured as NONE.

Note that the Clean Drive menu is dynamic in nature. Only tape drives meeting the above requirements appear in the menu. If the status of the tape drives change while the menu is being viewed, then the menu display will change accordingly. If none of the tape drives meet the automated cleaning requirements, the Clean Drive menu will not display.

To initiate the cleaning of a tape drive, move the item pointer to point to the desired drive and press the ENTER key. The tape drive will then disappear from the menu and the clean drive operation will be performed.

NOTE

If the cartridge in the cleaning location is not a cleaning cartridge, then it will remain in the drive until ejected by the host computer or unloaded by the menu's Operation\Unload command.

9.4   Operation\Demonstrations Menu

```
O•••••Demonstrations
 •Feature List
 START RANDOM MOVES
 STOP RANDOM MOVES
   Load Drives:  NO
```

The Demonstrations menu is primarily used in trade show exhibits to demonstrate the RLS. The commands in this menu cause the changer to start and to stop making continuous, random cartridge moves. The Feature List item is used to display messages about RLS features.

CAUTION

Do not enter the Demonstrations menu on a live system, where the RLS is connected to a functioning host computer.

9.4.1   Feature List

When the Feature List item is selected, a slide show type of presentation begins. The slide show displays a continuous series of messages that highlight various RLS features. Each message is displayed for a few seconds, then a new message appears. The slide show continues until the front panel/door is opened and the EXIT or MENU key is pressed.

9.4.2 START RANDOM MOVES Command

NOTE

This command is locked by the Inventory Lock and the Master Lock.

The `START RANDOM MOVES` command starts a continuous sequence of random cartridge moves, providing a visual presentation for trade shows and other demonstrations. The changer continues randomly moving cartridges until the `STOP RANDOM MOVES` command is invoked.

The `START RANDOM MOVES` command disappears from the menu after it is invoked. It reappears in the menu after the `STOP RANDOM MOVES` command is invoked to stop the demonstration.

9.4.3 STOP RANDOM MOVES Command

The `STOP RANDOM MOVES` command stops the continuous sequence of random cartridge moves that begins when the `START RANDOM MOVES` command is invoked.

The `STOP RANDOM MOVES` command appears in the menu after the `START RANDOM MOVES` command is invoked. It disappears from the menu after it is invoked to stop the demonstration.

9.4.4 Load Drives

This feature is used to enable the full insertion of a tape cartridge into an enabled tape drive during Random Moves. Use of this feature can dramatically slow the number of cartridge moves made per as well as cause additional wear to the tape cartridges and tape drives used. When the feature is disabled, tapes are only partially inserted into the tape drives such that the drive never threads the tape.

YES	Tape cartridges will be fully loaded, threaded and later unloaded from all enabled tape drives during Random Moves.
NO	Tape cartridges will be partially loaded, but not threaded in all enabled tape drives during Random Moves.

CAUTION

Make certain that all tapes in the RLS are good quality data tapes and acceptable to the drives prior to enabling the Load Drives feature for Random Moves. The use of non-data-grade tapes could damage the tape drives.

9.5   Operation\Element Status Menu

```
O•••••Element Status
 •Display
 •Find Label
 INITIALIZE
     Skip Labels: NO
 INVALIDATE
```

NOTE

The Find Label and Skip Labels menu items only appear if the RLS is equipped with a barcode reader.

This menu lists the `Operation\Element Status\Display` menu, and the `INITIALIZE` and `INVALIDATE` commands. If the RLS contains a barcode reader, this menu also contains the `Operation\Element Status\Find Label` menu and the `Skip Labels` value.

The `INITIALIZE` and `INVALIDATE` commands are used to manage the changer's inventory database, which the changer maintains within its non-volatile RAM. This information is available to the host software through the SCSI-2 Read Element Status command.

The changer never forgets its inventory (cartridge locations and their optional barcode label values). However, under default configuration settings, the changer assumes the inventory information is invalid if power is removed, or if the inventory is INVALIDATED when the Inventory Sentry Beam is broken. Therefore, each storage element has some validity information associated with it. Element validity information is displayed in the `Operation\Element Status\Display` menu, and is sent to the host in a Read Element Status operation.

The changer uses its inventory database to keep track of its cartridges. Part of this inventory information is the internal inventory state of each tape drive.

9.5.1   INITIALIZE Command

NOTE

This command is locked by the Inventory Lock and the Master Lock.

The `INITIALIZE` command is used to force the changer to review the validity of its cartridge inventory database. If the whole database is considered valid by the changer, no further action is taken. If any parts of the database are considered invalid, or unknown, the changer will rescan those parts. The database will be updated according to the rescan. This task can also be accomplished using the SCSI-2 Initialize Element Status command. Note that the host will not be aware of any

changes to the changer cartridge inventory database that occurred at the completion of the Initialize Element Status command update.

9.5.2   Skip Labels

If the RLS model contains a barcode reader, the `Skip Labels` value appears in the `Operation\Element Status` menu, beneath the `INITIALIZE` command. If the `Skip Labels` value is `NO`, then barcode labels will be read, and their values will be recorded in the `Element Status` database when an `INITIALIZE` command occurs. If the `Skip Labels` value is `YES`, then barcode labels will not be read.

9.5.3   INVALIDATE Command

NOTE

This command is locked by the Inventory Lock and the Master Lock.

The `INVALIDATE` command is used to invalidate the entire cartridge inventory database maintained by the changer. The changer will not allow an invalid database to exist if it has not reviewed the invalid or unknown parts. Therefore, the `INVALIDATE` command causes the changer to **always** rescan the entire cartridge inventory and to update its cartridge inventory database accordingly.

The `INVALIDATE` command has no effect upon Sequential or Random mode operations, or any other host-to-changer command in progress. Any host-to-changer command in progress is completed before the `INVALIDATE` command is performed. Further host-to-changer commands, received by the changer while the `INVALIDATE` command is in progress, will not be performed until the `INVALIDATE` command is completed. Note that the host will not be aware of any updates to the changer's cartridge inventory database that occurred at the completion of the `INVALIDATE` command update.

9.6   Operation\Element Status\Display Menu

```
OES•••••••••Display
 Location:    llllll
 Access:        NO
 Exception:     NO
       ASC:     xx
       ASQ:     xx
 Full:          NO
 Primary Tag:   NO
      Tag:??????????
 Source Valid:  NO
 Source Loc.:llllll
 Type:DATA TRANSFER
```

This menu displays specific information about any element in the changer. It displays the same information about a given element that the host would receive from issuing a SCSI-2 Read Element Status command. The SCSI-2 Read Element Status command is described in the RLS SCSI-2 Interface Reference (Qualstar document 501551). Please refer to this document for a detailed explanation of all the element status values displayed in the `Operation\Element Status\Display` menu.

The only editable value in the `Operation\Element Status\Display` menu is the `Location` value. The `Location` value prefix can be changed from "p" to "a"…"d" to show the SCSI Element Address value instead of the physical location.

Operation\Element Status\Display menu–Displayed Values

ASC and ASQ	These items only display when the value of `Exception` is `YES`.
TAG	This item only displays when the value of `Primary Tag` is `YES`.
Source Valid	This value is set to `YES` when the source data is valid.
Source Loc.	This item only displays when the value of `Source Valid` is `YES`.

9.7 Operation\Element Status\Find Label Menu

```
OES••••••Find Label
 Label:  ??????????
 Location:   llllll
```

NOTE

The Find Label menu only appears in the Operation\Element Status menu if the RLS is equipped with a barcode reader.

Use the `Find Label` menu to find the location of a cartridge with a unique or partially specified barcode search mask.

9.7.1 The Search Mask

To conduct a label search, first enter a search mask that can contain up to 10 alphanumeric characters from the following character set: 0-9, A-Z, the space character. Question marks (?) may be used to indicate *don't care* characters. Examples:

```
    040A03????      ??3?Q?01??      ???????1??
```

The changer left-justifies barcode label data and fills the remaining characters with spaces, before comparing the barcode data to the search mask. Each search mask position without a question mark must exactly compare with each barcode position.

A label search takes a few milliseconds to complete. Label searches are conducted through the changer's internal inventory database in the order of possible physical cartridge locations, not in the order of element addresses, as follows:

Tape Drives	T1 and up
Fixed Slots	F
Magazine Slots	MA1 and up (including VIOP slots)
Handler	H

When a match occurs, only the first location matching the search mask is displayed. Further label searches using the same search mask will yield the same result.

9.7.2   Entering a Search Mask

Place the item pointer to the left of the Label value, then press the ENTER key. A blinking cursor appears at the first character location. Use the V (UP) and W (DOWN) keys to select the first character, then press the ENTER key to move the cursor to the next character. Repeat this process until the desired search mask has been entered. Generally, the last two characters in the search mask may remain as question marks, since most barcode labels have eight, or less, characters.

9.7.3   Starting a Label Search

Press the EXIT key to start the label search operation. If a match is found, the complete label string, element address and location designator of the detected label is displayed. This *found* information would not be updated if the located cartridge were moved after the label search. If no match is found, the Label value does not change. Examples:

Search Mask before search	`LABEL  A3C 75????`
Search result with no match	`LABEL  A3C 75????`
Search result with a match	`LABEL  A3C 75` `Location:  1A03`

NOTE

> `Find Label` will only find a cartridge that has a valid barcode label that has been scanned.
>
> Each search operation is independent; "previous match" and "next match" searches are not possible.

9.8　Operation\Move Cartridge Menu

```
O•••••Move Cartridge
 From Loc.:  llllll
 To Location:llllll
 MOVE
```

NOTE

The MOVE command is locked by the Inventory Lock and the Master Lock.

This menu is used to move a cartridge to an empty location. It contains the MOVE command, which performs the same function as the SCSI-2 Move Medium command. The MOVE command uses the From Loc. and To Location value pairs. Simply edit the From Loc. and the To Location values, and then invoke the MOVE command. If no cartridge is at the From Loc., or if the To Location is occupied, the MOVE command will not be attempted. If a MOVE command is not attempted, an Alert message appears on the display.

A cartridge move from a location to itself is not considered an error, unless the location is empty, or a tape drive is occupied, but the tape cartridge is not ejected. A side effect for tape drives is that an ejected tape cartridge is reinserted into the drive.

CAUTION

Moving cartridges in this manner will change the inventory, regardless of Sequential mode allocation, or host reservation status. This may have adverse effects upon Random or Sequential operations. Use of this Function is not recommended unless its effect on the host system is fully understood.

9.9　Operation\Position Handler Menu

```
O•••Position Handler
 To Location:llllll
 POSITION
```

This menu is used to position the handler at a specific location. Using the POSITION command is a convenient way to locate a particular slot. It performs the same function as the SCSI-2 Position to Element command. Simply edit the To Location: value, and then invoke the POSITION command. Moving the carriage or carousel will not disrupt Random or Sequential operations, nor change the changer inventory status.

9.10 Operation\Position Magazine Menu

```
O••Position Magazine
To Location:llllll
 POSITION
```

This menu is used to position the carousel or storage array so that a specific magazine is at the loading position. Simply edit the `To Location:` value, and then invoke the `POSITION` command. This command will not disrupt Random or Sequential operations, nor change the inventory status.

9.11 Operation\Sequential Menu

```
Operation•Sequential
 •T1:   STOPPED•••••
 •T2:   EMPTY  •2B06
 •T3:   RUNNING•3A10
 •T4:   STOPPED•••••
```

This menu is dynamic. It only appears in the `Operation` menu if at least one tape drive is configured for the Sequential, Recycle or Dual-Bin modes. Furthermore, only those tape drives configured for the Sequential, Recycle or Dual-Bin modes will appear in this menu. Note that the word "Sequential" appears in this menu when Sequential, Recycle or Dual-Bin modes have been configured. For complete information on the Sequential, Recycle and Dual-Bin modes, see Chapter 10.

NOTE

Use the `Configuration\Drive\T?` *menu to configure a tape drive for the Sequential mode.*

There is a sub-menu item for each tape drive that appears. The information following the tape drive's number is status information about the Sequential operation of that drive and only the `Slot:` value is editable.

There are three possible states for Sequential operation. The following table describes those states and the location values that are displayed after them:

Sequential State	State Description	Location Description
STOPPED	Idle - waiting to start	Location of the cartridge to be loaded when next started
RUNNING	Sequential mode in progress	The return to location of the cartridge presently in the tape drive
EMPTY	Stopped, with the cartridge in the ejected position	The return to location of the cartridge presently in the tape drive

Table 9-2   Operation\Sequential Status Display Details

Notice there is a sub-menu for each tape drive that appears in the `Operation\Sequential` menu. This is indicated by a bullet in front of each drive's number. To control the Sequential operation of a tape drive, point to the drive's number and then press the ENTER key, to descend into the Sequential menu for the selected drive.

9.12 Operation\Sequential\T? Menu

```
O•Sequential••••••T?
 Mode:    SEQUENTIAL
 Start:       MANUAL
 Input First:llllll
 Input Last: llllll
 Input Slots:   ddd
OutputFirst:llllll
OutputLast: llllll
OutputSlots:   ddd
 Slot:       llllll
 Input Slot: llllll
 Output Slot:llllll
 EMPTY
 START
 STOP
```

NOTE

The EMPTY, START and STOP commands are locked by the Master Lock.

This menu is used to control Sequential operation of the tape drive specified in the upper-right corner of the display. The Sequential mode is used to perform large, unattended backups to a single tape drive. The use of this menu, and the entire subject of Sequential operation, is discussed in Chapter 10.

9.13 Operation\Unload Drive Menu

```
O•••••••Unload Drive
 T1
 T2
 T3
 T4
```

This menu will only appear when at least one tape drive has a tape cartridge loaded and is in the state of being ready to be unloaded. Selecting a listed drive and pressing the ENTER key will cause the tape drive to eject the cartridge and the drive will not appear in the menu until it again has a tape cartridge loaded.

10. Sequential Operation

10.1   Introduction

A sequential tape drive looks to the host computer as a singular tape drive with an operator supplying it with tapes. A host backup application which is not aware of tape libraries can simply write its backup data to the drive until the tape becomes filled. It then causes the tape to be rewound and ejected from the drive. A human operator or the Medium-changer can then insert the next tape needed to complete the backup operation. The host application is completely unaware of how the next tape gets inserted into the drive as well as where the tapes come from and go to. When the Medium-changer does the work of supplying tapes to and removing them from a tape drive, the process is called Sequential operation.

Each tape drive and cartridge storage location in the RLS may be configured through the menu system for random or sequential operation. If a tape drive is configured for the Random mode, it becomes a resource under the control of a host computer. If a drive and associated cartridge storage locations are configured for one of the Sequential modes, then the drive is referred to as a sequential drive it cannot be allocated for any other use. The insertion and removal of tapes to and from a Sequential tape drives is automatically performed by the Medium-changer when configured and manually started via the menu system.

There are three types of Sequential operation: Sequential, Recycle and Dual-Bin. For Sequential or Recycle operation, a single contiguous range of cartridge locations is assigned to each sequential drive for its exclusive use. In these modes, each tape cartridge is returned to its original storage location after it is ejected from the tape drive.

For Dual-Bin operation, two separate ranges of magazine locations are assigned to each sequential drive for its exclusive use. The Input range of locations is where the changer removes cartridges to be placed in the sequential drive. The Output range is where those cartridges are returned after the drive has ejected them.

Cartridge storage locations assigned to a given sequential drive belong exclusively to that drive and may not be assigned to any other sequential drive or random library. Empty slots in a Sequential, Recycle or Dual-Bin drive's storage location range will not adversely affect operation.

When a Sequential or Recycle operation is started (via the menu system), the changer moves the first cartridge, found at (or after) the initial specified storage location into the drive. When the drive ejects the cartridge, the changer automatically returns the cartridge to its original location. The changer then places the next cartridge, found within the drive's location range into the drive. This process is repeated, until the last specified cartridge is ejected and returned to storage. This sequence may be started at any location within a Sequential drive's location range but will always end at the last

storage location. In Recycle operations, the handler will return to the starting position and repeat the cartridge movement cycle indefinitely.

When a Dual-Bin operation is interactively started (via the menu system), the changer moves the cartridge found at (or after) its Input First location into the drive. When the drive ejects the cartridge, the changer automatically places it in the first empty cartridge location in the drive's Output location range. This process is repeated, until the last specified cartridge in the Input range has been ejected from the drive and placed into the Output range.

The host computer communicating with a sequential drive only communicates with the drive and not the changer. This allows the use of applications lacking library-specific, cartridge-movement, operating software.

All tape drives can be configured for concurrent Sequential, Recycle or Dual-Bin operation. Care should be exercised in allocating drives and storage locations as all allocations are done with from-to ranges. Gaps between ranges may become inaccessible.

This flexible design allows the user to partition the library's resources to best meet overall system needs. With a RLS-8444, for example, it is possible to have one library serve as the tape storage device for multiple systems. See Chapter 7 for detailed information on Resource Management.

10.2   Configuration\Drive\T? Menu

```
C•Drive••••••••••T?
 Mdl:          NONE
 SN ??????????????
 Enabled:       YES
 SCSI Bus: CHANGER
 SCSI Id:        dd
 Term Power:    OFF
 Clean Loc:  llllll
 POWER CYCLE
 Eject:        HOST
 Mode:       RANDOM
 Start:      MANUAL
 Input First:llllll
 Input Last: llllll
 Input Slots:   ddd
 OutputFirst:llllll
 OutputLast: llllll
 OutputSlots:   ddd
```

NOTE

All items in this menu are locked by the Configuration Lock and the Master Lock. Additionally, all items except `SCSI Bus, SCSI Id` *and* `Cleaning Loc` *are locked by the Door Lock. See Section 8.1.*

The item `T?` *in the menu shown above represents what is actually seen in the Display, namely the number of the tape drive whose parameters are being displayed (e.g., T1, T2, T3, etc.).*

This section repeats some of the Sequential setup information from Chapter 8.

Before Sequential operation can begin, the user must first configure one or more tape drives for Sequential operation. This is done by setting up some of the items in the `Configuration\Drive\T?` menu (shown above in bold type) for each Sequential tape drive. Each of these menu items is described in detail below.

10.2.1 Mode

Each installed tape drive in the RLS will be in one of four modes: Random, Sequential, Recycle or Dual-Bin. Briefly, in the Random mode, the tape drive is available to the host computer as a source/destination location for cartridge movements. In the Sequential, Recycle and Dual-Bin modes, the host computer cannot directly cause cartridge movements to or from the tape drive.

RANDOM	The tape drive is available for normal cartridge movement operations to and from the drive under host computer control.
	The remaining parameters below the `Mode` value in this menu are not used during Random mode operations, but are used during Sequential, Recycle or Dual-Bin mode operations.
SEQUENTIAL	The tape drive is dedicated to receiving cartridges under changer control. The changer will not perform host-requested cartridge movements to this device.
RECYCLE	The Recycle mode shares the attributes of the Sequential mode. It has the additional feature of automatically restarting the cartridge movement cycle after the last cartridge in the drive's location range has been returned.
DUAL-BIN	The tape drive is dedicated to receiving cartridges under changer control. The changer will not perform host-requested cartridge movements to this device. This mode is similar to Sequential except the source and destination cartridge locations are separate and distinct.

NOTE

The `Mode` value must be set after the Input and Output ranges have been set. Any changes to these values cause the `Mode` value to default to `RANDOM`.

10.2.2 Sequential or Recycle Configuration

The `Mode` value in the `Configuration\Drive\T?` menu cannot be set to `Sequential or Recycle` if one or more of the following conditions exist:

- The drive's allocated magazine storage locations conflict with an enabled logical library.

- The drive's allocated magazine storage locations conflict with another drive's allocated magazine storage locations, and that drive is already set to the Sequential, Recycle or Dual-Bin mode.

- The drive is reserved by the SCSI host.

- `Mdl` is configured as `NONE`.

- Either the `Input First` or the `Input Last` is unassigned.
  An unassigned value is indicated by five dots (.....) in the Display.

- One or more of the drive's allocated magazine storage locations are reserved by the SCSI host (see the `Maintenance\Display Reservs.` menu).

- Resources must be unassigned before a library's mode can be changed from Random to Sequential, Recycle or Dual-Bin.
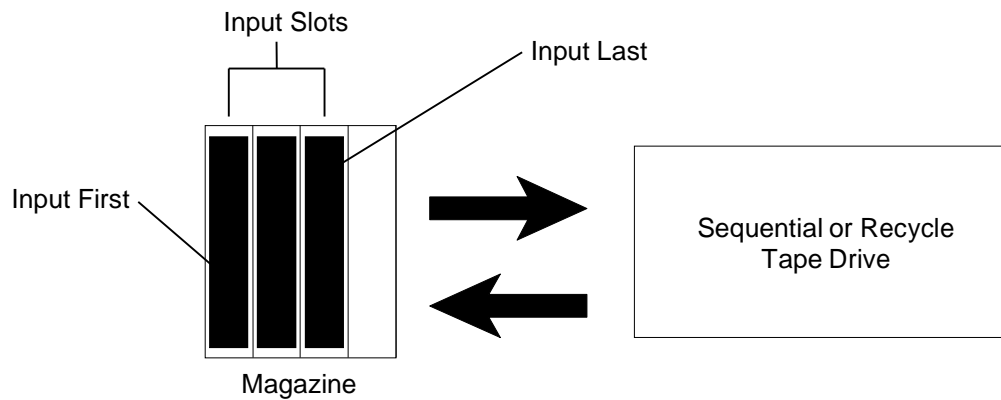
Figure 10-1   Sequential or Recycle Configuration Example (logical, not physical depiction)

10.2.2.1   Input First

The `Input First` value works together with the `Input Last` value to allocate a contiguous range of magazine storage locations to this tape drive for Sequential or Recycle operation.

Allocate the first magazine storage location to this drive (`T?`) as follows:

1. Determine the number of cartridges for use with this drive (`T?`).

2. Select a continuous range of magazine storage location designators, locations not already allocated or reserved, to hold the cartridges selected in step one.

3. Set the `Input First` value of this menu to the location of the first magazine storage location selected in step 2.

10.2.2.2 Input Last

The `Input Last` value works together with the `Input First` value to allocate a contiguous range of magazine storage locations to the specified tape drive for Sequential or Recycle operation.

Allocate the last magazine storage location to this drive (`T?`) as follows:

1.   Set this menu's `Input First` value as described in Section 10.2.2.1.

2.   Set this menu's `Input Last` value to the location of the last magazine storage location selected in Section 10.2.2.1.

NOTE

*When this menu's `Input First` value is set **and** the number of cartridges allocated for Sequential or Recycle operation with this menu's drive (`T?`) is set in this menu's `Input Slots` value, it is not necessary to edit this menu's `Input Last` value.*

10.2.2.3 Input Slots

This value indicates the total number of magazine storage locations allocated for Sequential or Recycle operation with this drive. This value is not editable.

10.2.2.4 Mode

Set the `Mode` value to Sequential or Recycle. If the `Mode` value cannot be changed, then there is a conflict with another sequential drive or an enabled logical library.

10.2.3 Dual-Bin Configuration

The `Mode` value in the `Configuration\Drive\T?` menu cannot be set to `Dual-Bin` if one or more of the following conditions exist:

- The drive's allocated magazine storage locations conflict with an enabled logical library.
- The drive's allocated magazine storage locations conflict with another drive's allocated magazine storage locations, and that drive is already set to the Sequential, Recycle or Dual-Bin mode.
- The drive is reserved by the SCSI host.
- `Mdl` is configured as `NONE`.
- Any of the `Input First`, `Input Last`, `Output First` or `Output Last` values are unassigned. An unassigned value is indicated by five dots (.....) in the Display.
- The drive's Input range (from `Input First` through `Input Last` values) overlaps the drive's Output range of (`Output First` through `Output Last` values).

- The drive's Input range (`Input Slots` value) is greater than the drive's Output range of magazine storage locations (`Output Slots` value).

- One or more of the drive's allocated magazine storage locations are reserved by the SCSI host (see the `Maintenance\Display Reservs.` menu).

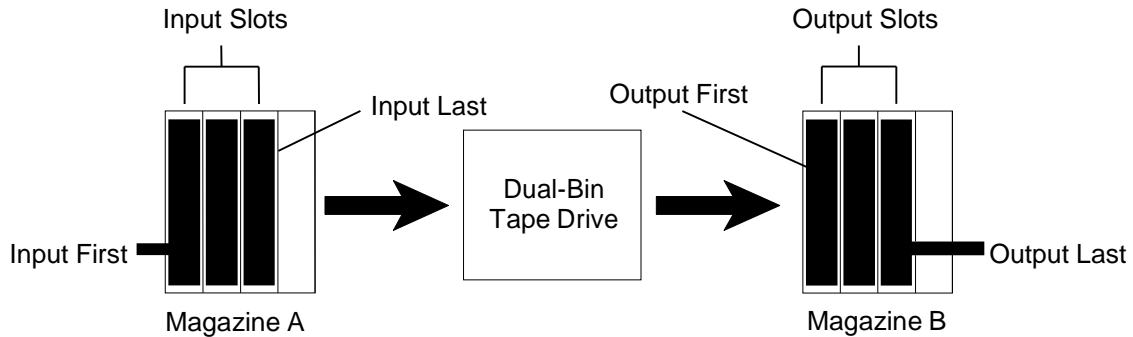- The entire changer is reserved by the SCSI host.

Figure 10-2   Dual-Bin Configuration Example (logical not physical depiction)

10.2.3.1   Input First

This value works together with the `Input Last` value to allocate a contiguous range of magazine storage locations for input to this tape drive (`T?`).

Allocate the magazine storage location as follows:

1. Determine the number of cartridges for use with this drive (`T?`).

2. Select a continuous range of input magazine storage locations not already allocated or Reserved, to hold the cartridges determined in step one.

3. Set the `Input First` value of this menu to the location of the first magazine storage location selected in step 2.

10.2.3.2   Input Last

This value works together with the `Input First` value to allocate a contiguous range of magazine storage locations to this tape drive (`T?`) to create the Input range for Dual-Bin operation.

Allocate the magazine storage location as follows:

1. Set the `Input First` value as described in Section 10.2.3.1.

2. Set the `Input Last` value to the location of the last magazine storage location selected in Section 10.2.3.1.

NOTE

When this menu's `Input First` *value is set **and** the number of cartridges allocated for Sequential or Recycle operation with this menu's drive (`T?`) is set in this menu's* `Input Slots` *value, it is not necessary to edit this menu's* `Input Last` *value.*

10.2.3.3 Input Slots

This value indicates the number of magazine storage locations allocated for the Input range for Dual-Bin operation with this drive. This value is not editable.

NOTE

The Dual-Bin mode will not be available if the Input range of magazine storage locations overlaps the Output range of magazine storage locations. Additionally the Output Slots value must be set equal to or greater than the Input Slots value.

10.2.3.4 Output First

This value works together with the `Output Last` value to allocate a contiguous range of magazine storage locations for the output of this tape drive (`T?`) in Dual-Bin operation.

Allocate the magazine storage location as follows:

1. Determine the number of Input cartridges selected for use in Section 10.2.3.1.

2. Select a continuous range of Output magazine storage locations not already allocated or reserved, to hold the Input cartridges determined in step one.

3. Set the `Output First` value of this menu to the location of the first Output magazine storage location selected in step 2.

10.2.3.5 Output Last

This value works together with this menu's `Output First` value to allocate a contiguous range of magazine storage locations to this drive (`T?`) to create the Output range for Dual-Bin operation.

Allocate the magazine storage location as follows:

1. Set this menu's `Output First` value as described in Section 10.2.3.4.

2. Set this menu's `Output Last` value to the location of the last magazine storage location selected in Section 10.2.3.4.

When this menu's `Output First` *value is set **and** the number of cartridges allocated for Dual-Bin operation with this menu's drive (`T?`) is set in the* `Output Slots` *value, it is not necessary to edit this menu's* `Output Last` *value.*

10.2.3.6 Output Slots

This value indicates the number of magazine storage locations allocated for the Output range for Dual-Bin operation with this menu's drive. This value is not editable.

10.2.3.7 Mode

Set the `Mode` value to Dual-Bin. If the `Mode` value cannot be changed, then there is a conflict with another sequential drive or an enabled logical library.

10.2.4 Start

The Start value allows a tape drive that is configured for one of the three sequential modes to automatically start at power-on or after an inventory violation has stopped the library when set for `INVENTORY` or `POWER-ON`. Any tape drives configured for the Random mode will ignore the Start value.

The Start value has three possible settings:

MANUAL	If a cartridge is in the tape drive at power-on, the library stops and waits for the operator to either manually eject the cartridge or call upon the host system to eject it. After the cartridge is ejected it must be moved back to the location it came from. The sequential operation can then be restarted by manually invoking the `START` command.
	If a cartridge is in the tape drive after a library has stopped because of an inventory violation, the library attempts to continue from where it left off.
INVENTORY	If a cartridge is in the tape drive at power-on or after an inventory violation, the previous input and output slots are invalidated. If after the library completes an inventory scan and finds the input and output slots are both valid, the library attempts to continue from where it left off. If the input and output slots are both invalid, the library will search at the beginning of the range for the first empty slot. It will then restart using the next tape that was found after the first empty slot in the input range. In any other case the library will stop.
POWER-ON	This mode behaves like INVENTORY, but it only starts the library at power-on.

10.3 Operation\Sequential Menu

```
Operation•Sequential
•T1: STOPPED ••••
•T2: EMPTY    •2B06
•T3: RUNNING •3A10
•T4: STOPPED •1B01
```

This is a dynamic menu. It will only appear in the `Operation` menu if one or more tape drives have been configured for the Sequential, Recycle or Dual-Bin mode via the `Configuration\Drive\T?` menu. Furthermore, a sub-menu for only those drives that have been configured for the Sequential, Recycle or Dual-Bin mode will appear in this menu. Note that the word "Sequential" appears in this menu when Sequential, Recycle or Dual-Bin modes have been configured. The information following the drive number is state information about the Sequential operation of that drive and is not editable.

There are three possible states for Sequential operation. The following table describes those states and the locations that are displayed after them.

Sequential State	State Description	Location Description
STOPPED	Idle - waiting to be started.	Location of the cartridge to be loaded when next started. Five dots indicate a completed or unstarted Sequential operation (as shown above for drive T1).
RUNNING	Sequential mode in progress.	The return to location of the cartridge presently in the drive.
EMPTY	The drive has an ejected cartridge that has not yet been returned by the changer.	The return to location of the cartridge presently in the drive.

Table 10-1 Operation\Sequential Status Display Details

To control the Sequential operation of a drive, point to the drive number and press the ENTER key to descend into the Sequential menu for that drive.

10.4   Operation\Sequential\T? Menu

```
O•Sequential••••••T?
 Mode:    SEQUENTIAL
 Start:       MANUAL
 Input First:llllll
 Input Last: llllll
 Input Slots:    ddd
 Slot:        llllll
 EMPTY
 START
 STOP
```

**Figure 10-3   Sequential
or Recycle Mode**

```
O•Sequential••••••T?
 Mode:       DUAL-BIN
 Start:        MANUAL
 Input First:llllll
 Input Last: llllll
 Input Slots:    ddd
 OutputFirst:llllll
 OutputLast: llllll
 OutputSlots:llllll
 Input Slot: llllll
 Output  Slot:llllll
 EMPTY
 START
 STOP
```

Figure 10-4   Dual-Bin Mode

NOTE

The item `T?` *in the menu shown above represents what is actually seen in the Display, namely the number of the tape drive whose parameters are being displayed (e.g. T1, T2, etc.).*

There is an `Operation\Sequential\T?` menu for each tape drive that is configured for Sequential, Recycle or Dual-Bin operation. The display of this menu is distinctly different for the Dual-Bin mode, thus both are depicted above. The editable values are indicated in **bold** type. The current state of the operation determines which one of the three commands (EMPTY, START, or STOP) is visible. These commands start and stop the configured sequential mode. The `Input` and `Output` values are those set in the `Configuration\Drive\T?` menu and are displayed here for reference (the values are not editable).

NOTE

The state of Sequential operation for the displayed drive must be `STOPPED` *before the* `Slot,` `Input Slot or Output Slot` *values in this menu can be edited.*

10.4.1   Slot

This value indicates the current cartridge location of the sequence. If the operation has not been started, this will be the unassigned value. The Slot value can be edited only when the Sequential state is stopped.

If the Slot value is unassigned, the Sequential operation will begin with the first cartridge encountered in its location range. If Slot is any other value, then the Sequential operation will begin with the first cartridge at or after the value.

10.4.2 Input Slot and Output Slot

These two values indicate the current input and output cartridge locations of the sequence. If operation has not been started, these will be unassigned values. The Input Slot and Output Slot values can be edited only when the Dual-Bin state is stopped.

If the Input Slot value is unassigned, the Dual-Bin operation will begin with the first cartridge encountered in its location range. If Input Slot is any other value, then the Dual-Bin operation will begin with the first cartridge at or after the value.

10.4.3 START Command

This command appears when sequential operation is stopped and no tape is present in the drive. Invoking this command will start the Sequential, Recycle or Dual-Bin operation. After the sequential operation begins, the STOP command appears instead of the START command.

10.4.4 STOP Command

This command appears when sequential operation is running. Invoking this command will stop the Sequential, Recycle or Dual-Bin operation. After the sequential operation stops, the START or, if appropriate, the EMPTY command appears instead of the STOP command.

Once started, a Sequential operation automatically runs to completion. Completion is defined as either one of the following two cases:

- When the changer can find no more cartridges in the allocated magazine storage location range.

- When the cartridge from the Last value is returned to its magazine storage location.

NOTE

During Sequential operation, the changer retrieves the next available cartridge in the allocated magazine location range. This means that it will skip over empty magazine slots in the allocated magazine location range with no ill effects.

When the Sequential operation for this drive is completed:

- The `Operation\Sequential` menu indicates `STOPPED` for this drive (T?).

```
•T?:    STOPPED •••••
```

- For Sequential or Recycle Configuration:
  In the `Operation\Sequential\T?` menu the Slot value indicates "•••••".

```
 Slot:          •••••
```

- For Dual-Bin Configuration:
  In the `Operation\Sequential\T?` menu the Input Slot value indicates
  "•••••" and the Output Slot indicates the magazine cartridge location of the last
  tape placed in the output range.

```
 Input Slot:    •••••
 Output Slot:    llll
```

10.5   Interruptions

This section deals with the effects of interruptions to Sequential operation. These
interruptions include:

- Power Failure/Interruption.

- Violation of the Inventory (as defined in the
  `Configuration\Advanced\Control Panel\Alarm` menu in Chapter 7).

- Unrecoverable Handler Fault.

10.5.1   Power Failure/Interruption

A power failure is an unintentional occurrence, while a power interruption is most
likely the result of someone intentionally turning the power off. Unfortunately, the
changer cannot distinguish between the two events. Under the `MANUAL` mode of the
`Operation\Sequential\T?\Start` menu the changer cancels any previously–
running sequential operations when power is applied (or reapplied). Under the
`INVENTORY` and `POWER-ON` modes the changer will attempt to continue from where
it left off when power is applied (or reapplied).

If a cartridge was in a sequential tape drive configured for the `MANUAL` mode of the
`Operation\Sequential\T?\Start` menu when the power was interrupted, it
will remain in the drive when the power comes back on. In this case, either open the
door and manually eject the cartridge from the drive, or call upon the host system
(which may also have experienced a power interruption) to eject it. Then use the
`MOVE` command in the `Operation\Move Cartridge` menu to return the
cartridge to its proper magazine storage location. The `Slot` value may need to be
changed before restarting Sequential operation (see Section 10.4.1).

10.5.2 Breaking the Inventory Sentry Beam

Breaking the Inventory Sentry Beam violates the changer's inventory and stops the sequential process. However, the sequential tape drive in use continues to operate when under the MANUAL and INVENTORY modes of the Operation\ Sequential\T?\Start menu. Any sequential tape drives under the POWER-ON mode will stop and have to be restarted using the START command.

If the cartridge is ejected from the sequential drive while the door is open, the changer will not automatically return the cartridge to its magazine storage location. At this point, the MOVE command in the Operation\Move Cartridge menu can be used to put the cartridge back into its magazine storage location.

10.5.3 EMPTY Command

This command appears when sequential operation is stopped and the cartridge is ejected from the drive. It may be invoked to return the tape to its destination slot.

10.5.4 Unrecoverable Handler Fault

An unrecoverable handler fault is a condition that requires operator intervention: for example, a cartridge incorrectly inserted into a magazine. The condition should be corrected before continuing. Pressing the EXIT key will clear the display if the condition has been adequately corrected.

11.   Q-Link Remote Manager

11.1   Setup Q-Link IP Address

Navigate to the RLS menu item `Configuration\Q-Link`. This menu panel is used to set Q-Link network addresses. Consult your LAN Administrator for the correct setup values.

1. If the RLS library and Q-Link module are operational, the default address values will be displayed.

```
C••••••••••••Q-Link
>Ip:192.168.0.2
 Ma:255.255.255.0
 Gw:0.0.0.0
 Use DHCP:       OFF
 Link Status:    UP
 MAC:   xxxxxxxxxxxx
 Date:   mm/dd/yyyy
 Part Number:700xxx
 Revision:    d.d.d
 Checksum: xxxxxxxx
 RESET
 SET ADDRESSES
 DEL ADMIN PASSKEY
```

2. To change the IP address, use the V (UP) and W (DOWN) keys to navigate the selection indicator to the `Ip` field. Press the ENTER key to position the edit cursor to the desired character location. Use the V (UP) and W (DOWN) keys to change the digit to the required value. Press the EXIT key to end the edit operation. Note that this field cannot be edited if `Use DHCP` is `ON`.

```
C••••••••••••Q-Link
>Ip:192.168.0.2
 Ma:255.255.255.0
 Gw:0.0.0.0
 Use DHCP:       OFF
 Link Status:    UP
 MAC:   xxxxxxxxxxxx
 Date:   mm/dd/yyyy
 Part Number:700xxx
 Revision:    d.d.d
 Checksum: xxxxxxxx
 RESET
 SET ADDRESSES
 DEL ADMIN PASSKEY
```

3. Use the same procedure to change the Mask (`Ma`) and Gateway (`Gw`) network address fields. Note that these fields cannot be edited if `Use DHCP` is `ON`.

4. If DHCP is to be used, the network address values are provided by Q-Link interface. Use the V (UP) and W (DOWN) keys to navigate the selection

indicator to the Use DHCP field. Press the ENTER key to edit the selection. Use the V (UP) or W (DOWN) key to change the selection to ON. Press the EXIT key to end the edit operation.

```
C•••••••••••••Q-Link
>Ip:192.168.0.2
 Ma:255.255.255.0
 Gw:0.0.0.0
 Use DHCP:       OFF
 Link Status:    UP
 MAC:   xxxxxxxxxxx
 Date:    mm/dd/yyyy
 Part Number:700xxx
 Revision:    d.d.d
 Checksum: xxxxxxxx
 RESET
 SET ADDRESSES
 DEL ADMIN PASSKEY
```

5. Use the SET ADDRESSES command to complete the address setup procedures. The changes are sent to Q-Link module, and the display will refresh with the values accepted by Q-Link interface. Use the V (UP) and W (DOWN) keys to navigate the selection indicator to the SET ADDRESSES command.

```
C•••••••••••••Q-Link
>Ip:192.168.0.2
 Ma:255.255.255.0
 Gw:0.0.0.0
 Use DHCP:       OFF
 Link Status:    UP
 MAC:   xxxxxxxxxxx
 Date:    mm/dd/yyyy
 Part Number:700xxx
 Revision:    d.d.d
 Checksum: xxxxxxxx
 RESET
 SET ADDRESSES
 DEL ADMIN PASSKEY
```

NOTE

The SET ADDRESSES command will only appear if the Ip, Ma or Gw addresses have been edited.

6. To set the changes press the ENTER key. The display will change to indicate the setup operation is in progress.

```
••••PLEASE•WAIT••••
IP Setup operation
in progress.
```

7. The display will refresh with the values accepted by Q-Link interface. This example uses DHCP. Q-Link module has returned address values obtained from the network DHCP server.

```
C•••••••••••••Q-Link
 Ip:192.168.0.10
 Ma:255.255.255.0
 Gw:0.0.0.1
 Use DHCP:       ON
 SET ADDRESSES
 DEL ADMIN PASSKEY
```

11.1.1   DEL ADMIN PASSKEY

This command resets Q-Link's User 1 (Admin) Passcode (user name or password) back to blank in the TLS while "**update**" access is valid. If the passcode (name and password) has been forgotten, follow the instructions below. This command will not affect the Ip, Ma and Gw values.

1. Use the W (DOWN) key to navigate the selection indicator to the DEL ADMIN PASSKEY field.

```
C•••••••••••••Q-Link
>Ip:192.168.0.2
 Ma:255.255.255.0
 Gw:0.0.0.0
 Use DHCP:       OFF
 Link Status:    UP
 MAC:   xxxxxxxxxxxx
 Date:   mm/dd/yyyy
 Part Number:700xxx
 Revision:     d.d.d
 Checksum: xxxxxxxx
 RESET
 SET ADDRESSES
> DEL ADMIN PASSKEY
```

2. Press the ENTER key once and the display will change to indicate the confirmation message.

```
••••••WARNING•••••••
 Operation will set
 Q-Link defaults.
 ENTER to continue.
```

3. Press the ENTER key to execute the DEL ADMIN PASSKEY command.

11.2   Connect Q-Link to the Ethernet LAN

After Q-Link's Ethernet address is configured (see Section 11.1), it can be attached to your LAN.

Yellow LED signals network activity is occurring.

Green LED signals a link has been established.

RJ45 Connector

Network Connection
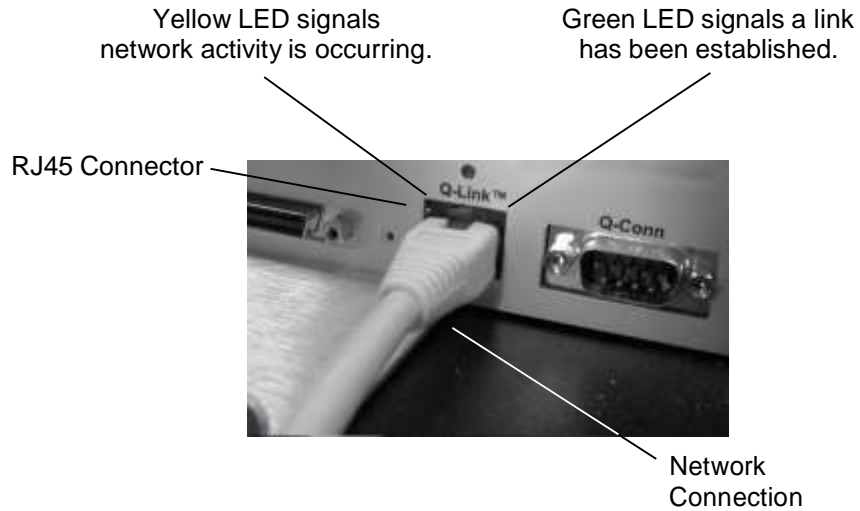
Figure 11-1 Detail of Network Connection Attached to Q-Link

11.3   Browser Compatibility

Q-Link has been tested with Internet Explorer 6 (and higher), Netscape 6.2 (and higher) web browsers, Java Virtual Machine 1.3.10 and the Microsoft Virtual Machine, which ships with Microsoft operating systems prior to XP. While other browsers can be used, the page display and operation may not be correct. The Mac interface has been certified using OS X Server (10.1.2) using Netscape V7.02 (Mozilla 1.0.2) for all functions except for writing data with the java applet interface.

11.3.1   Browser Requirements

1.   An approved Java Virtual Machine must be installed on the computer.

2.   Javascript must be enabled.

3.   Cookies must be enabled.

11.4   E-mail Requirements

For e-mail capability, an SMTP server and a Name server must be specified.

11.5   Access Q-Link with a Web Browser

After Q-Link is connected to the Ethernet LAN, it can be accessed via Internet Explorer 6 or Netscape 6.2 web browsers. Target the web browser to Q-Link's IP address. The sample address shown in the following examples is:
`http://10.10.10.10`

11.6 Quick Start Guide

- A factory default library will go directly to the Library Quick View screen.

- Type `http://10.10.10.10/paccess.cgi` (Your address will probable be different.) and press return. This will show the Private folder in the menu tree.

- Click on the Passwords menu item in the menu tree to access the Private\Passwords screen.

- Check the Edit Q-Link check box, the Edit email check box and any other desired privileges check boxes. Click Submit.

- Log out and then log in for the changes to take effect.

- Go to the Configuration\Advanced\Q-Link page to edit the Name server and SMTP server data. Click Submit Changes.

- Go to the Private\Email page to add email recipients and any event notices. Click Submit.

- Click Send Test Email and then check the recipient's inbox for the email.

For a more detailed explanation of Q-Link, please see the following sections.

11.7 Getting Started with Q-Link

In the following examples the sample address is: `http://10.10.10.10`. The address you will be using will probable be different. Additionally, when the word "passcode" is used it refers to both the User Name and Password information.

11.7.1 The Sign-In Screen

The default settings when Q-Link is shipped from the Qualstar factory are a blank User Name and a blank Password. Q-Link will bypass the sign in screen as long the User Name and Password are blank. If a User Name and Password have been assigned the sign in screen will appear as seen in Figure 11-2. Simply entering the correct User Name and Password followed by clicking on the Sign In button will allow access to Q-Link's menus.

Figure 11-2 User Name and Password required to enter this site sign in screen

If the Log Out button is clicked when the User Name and Password are blank a screen will appear that allows the user to log back into Q-Link. See Figure 11-3. Simply clicking on the underlined Log In words will allow the user to log back into Q-Link.

Q-Link: Logged Out from `10.10.10.10`... `Log In`

Figure 11-3   Sample of the Log In screen when the User Name and Password are Blank

11.7.2   The Private Folder

The Private\Passwords menu supports up to 10 users, each with individual access privilege levels. The factory default settings do not show the Private Configuration page automatically so, to use the multi-user and privilege level features, type `http://10.10.10.10/paccess.cgi` (Your address will probable be different.) then press return. This will refresh the browser and show the Private folder in the menu tree.

11.7.3   The Private\Password Screen
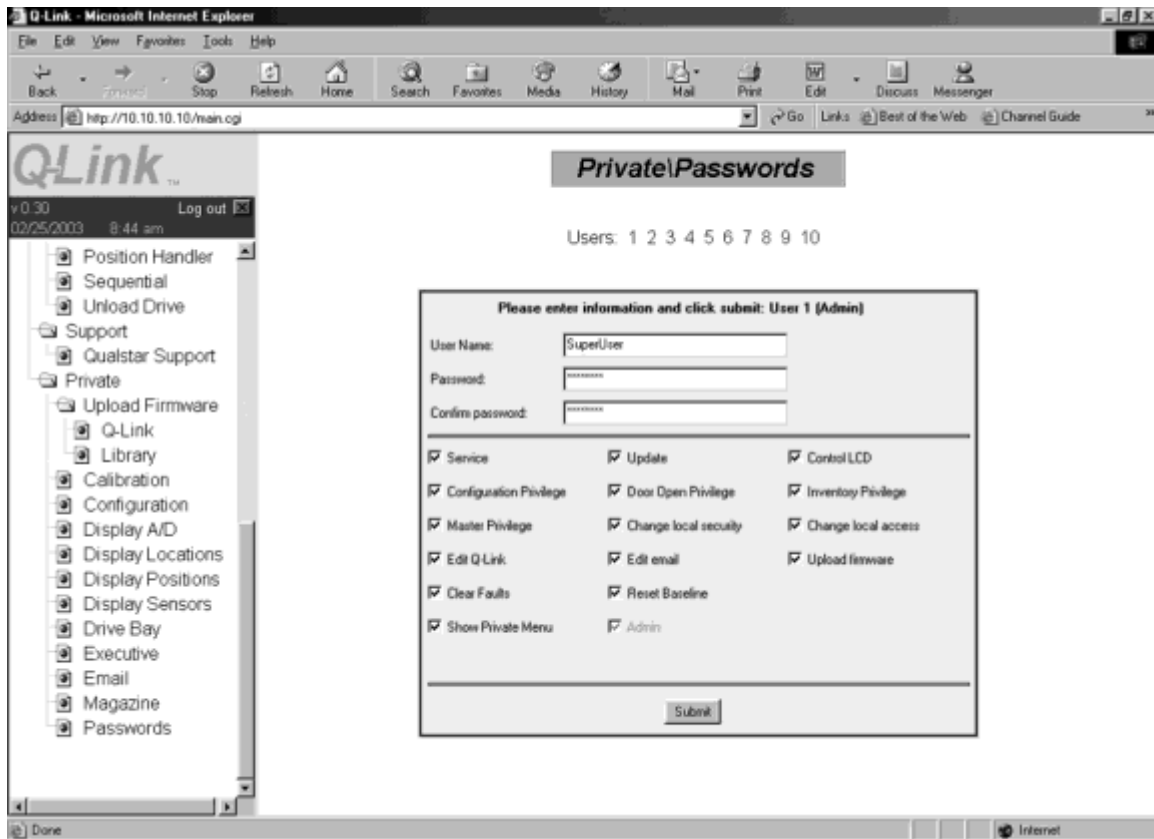
Figure 11-4   Example of the Private\Passwords Screen as seen on a Web Browser

Click on the Passwords menu item in the menu tree to access the Private\Passwords screen. User 1 (Admin) is the default administration user and it displays all privilege levels as selectable except for Admin, which is always checked for User 1.

When a user is logged in as Admin, all users are configurable. When a user is logged in without Admin privileges, the user is given no option to select other users and can only edit their own User Name and Password. See Figure 11-5.

Figure 11-5   Sample of a Private\Passwords Screen without Admin Privileges

The Configuration, Door Open, Inventory and Master privileges are direct representations of the privileges in the RLS manuals and will allow/disallow a user to edit certain items as described in the appropriate RLS-8000 Installation and Operation/Technical Service Manuals. The Service and Update privileges function the same as having "Service" and "Update" as access words in the RLS. These six privileges function totally independently of the RLS' privileges. For example, giving a user service privileges does not change the privileges at the local library. The remainder of the privileges allow the user to manipulate items and pages in the web server.

After selecting or deselecting any privileges, type in the Password and Confirm password information, then press the submit button. If changing the Password is desired, follow the instructions below.

1.   Click once in the Password text entry box and then type in your chosen password.

2.   Press the Tab key or click once in the Confirm password text entry box and then type in the password exactly the same as it was in the Password text entry box.

3.   Click once on the Submit button to complete the changing of Password.

In order for any changes to take effect, the operator must Log out from Q-Link and then Log in to update the settings.

If the Password and Confirm password information does not match upon pressing the submit button, the following text will be seen in a Q-Link Message window **Password\Confirm Password entries are not the same. Please reenter them.** See Figure 11-6. Click in the OK box of the message window and then retype the password and confirmation information to proceed.

Figure 11-6   Password\Confirm Password entries are not the same Q-Link Message Window

---

NOTE

If the User 1 (Admin) Passcode (user name or password) has been forgotten, it can be set to blank by using the DEL ADMIN PASSKEY command in the RLS while "update" access is valid. Please refer to the RLS-8000 Tape Library Technical Service Manual (Qualstar document number 501510) for additional information on the Private menu.

11.8   Edit the Name Server and SMTP Server Data

Click on the Q-Link menu item under the Advanced folder in the menu tree to access the Configuration\Advanced\Q-Link page and follow the instructions below.

1.   Edit the Name server and SMTP server data.

2.   Click the Submit Changes button.

11.9   Edit the Email Data

If your mail server provides ESMTP (Extended Simple Mail Transfer Protocol) services, you may provide a name and password for SMTP authentication. Additionally you may change the name (library name) and domain of the email server

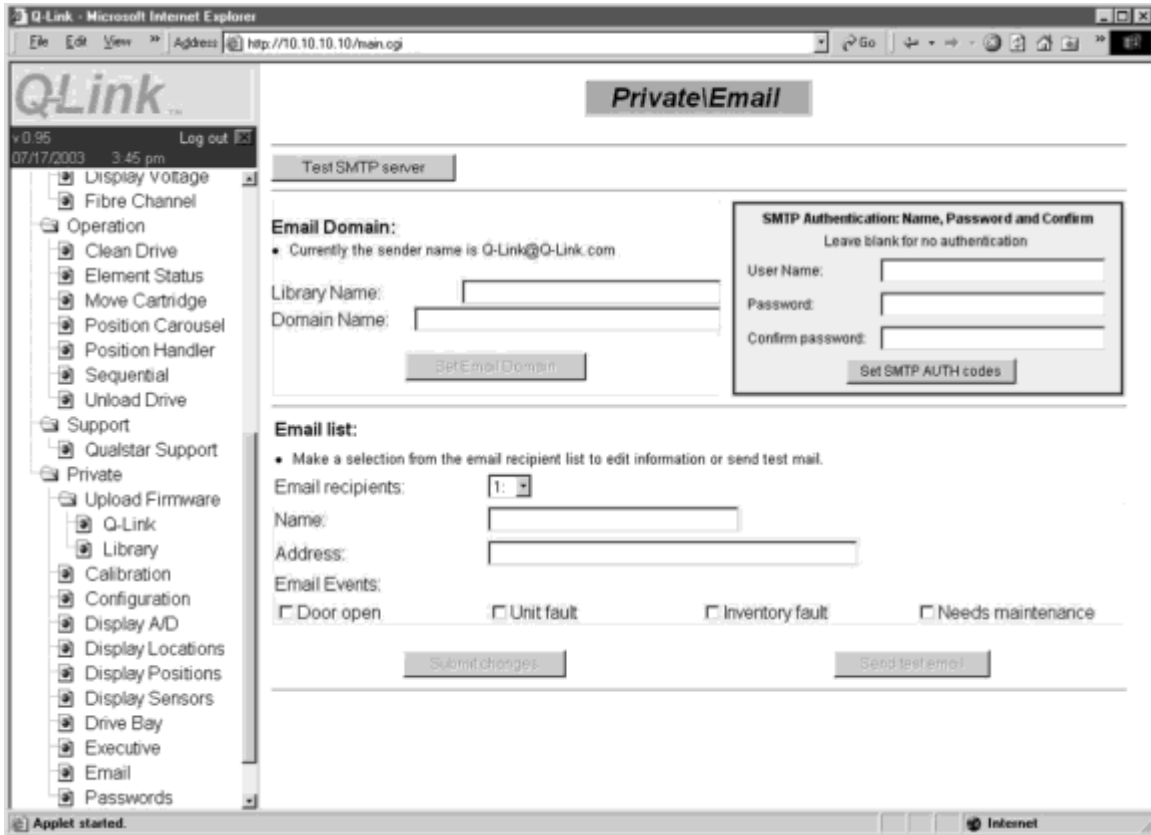address. The default address for blank entries is Q-Link@Q-Link.com. See Figure 11-7.

Figure 11-7   Sample of the Private\Email Screen

Q-Link supports up to 10 individual email addresses that can be assigned to receive an email message when one or more of the following events occur:

- Door open

- Unit fault

- Inventory fault

- Needs Maintenance

Click on the Email menu item under the Private folder in the menu tree to access the Private\Email page and follow the instructions below.

1.   Type in the name and email address of an email recipient.

2.   Check any event that you would like the email recipient to be notified of.

3.   Click the Submit button.

4.   Repeat steps 1 through 3 for each email recipient.

5. Click the Send test email button and then check the email recipient's inbox for the message.

11.10 SNMPv1 (Simple Network Management Protocol)

The simple network management protocol allows SNMP management software to get the status of various aspects of the library. This service is always active, but by default, traps (messages) are disabled until enabled by the user. The SNMP MIB is always available from the Configuration\Advanced\Q-Link screen. Click on "Retrieve the SNMP MIB" and Q-Link will serve up the MIB. There are three SNMP community names; "public" for read only access, "private" for read/write access and "trap" for trapdest.

Features of SNMP for Q-Link:

• SCSI, the optional fibre channel interface and various library performance statistics are displayed in the SNMP module.

• All tape drives are accessible with the drive indexer item.

• All tape cartridge inventory is accessible via the slot indexer item.

• The trap host is configurable via the SNMP interface item agentTrapDest.

• The enabling and disabling of traps is configurable via the SNMP interface item agentTrapsEnabled.

• The traps are the same as those offered in Q-Link: Door Open, Unit Fault, Inventory Violation and Needs Maintenance.

• Traps are sent out five times: At first occurrence and then at two, four, eight and eight minute intervals.

11.11 Uploading Firmware

Q-link allows for the uploading of new Q-Link and library firmware.

NOTE

Firmware should only be updated after consulting with Qualstar's Technical Support Department. They can be reached at (805) 583-7744 or E-mail them at support@qualstar.com

11.11.1 Q-Link Firmware Uploading

Click on the Q-Link menu item under the Upload Firmware folder in the menu tree to access the Private\Firmware Upload\Q-Link screen and follow the instructions below.

1. Access the firmware file by either clicking on the Browse button or typing the file path to the firmware file. See Figure 11-8.
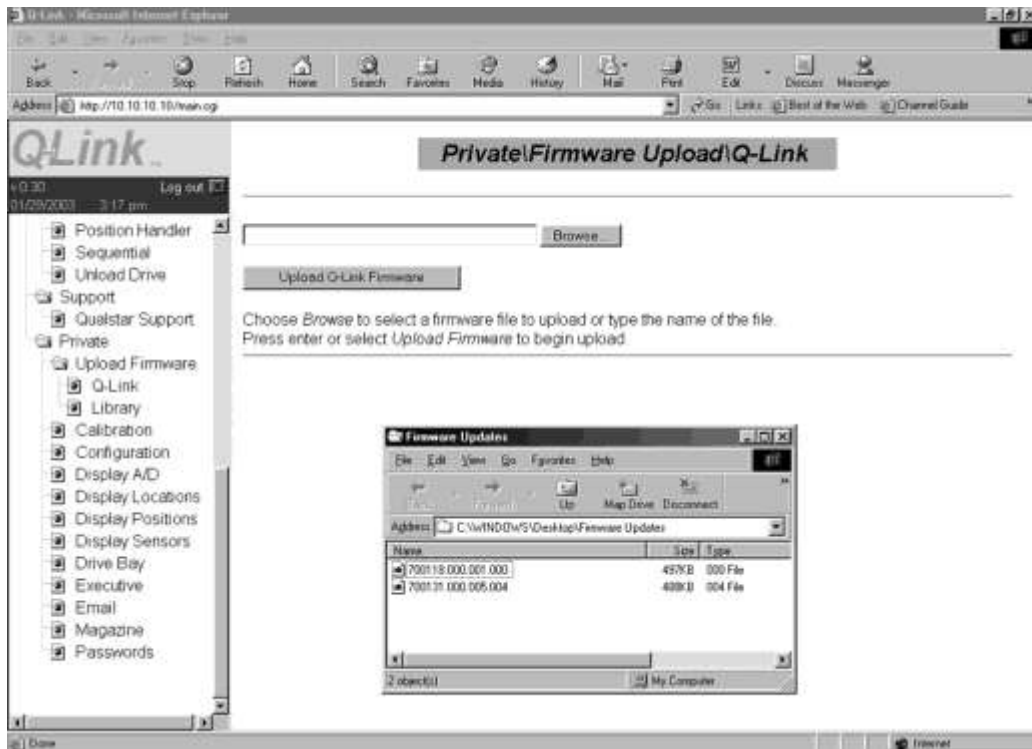
Figure 11-8   Sample of the Q-Link Firmware Upload Screen

2. Press the enter key or click on the Upload Firmware button to begin the uploading process.

3. Click once on the Submit button to complete the changing of Password.

4. Two different screens will appear as the uploading process proceeds. See Figure 11-9 and Figure 11-10.
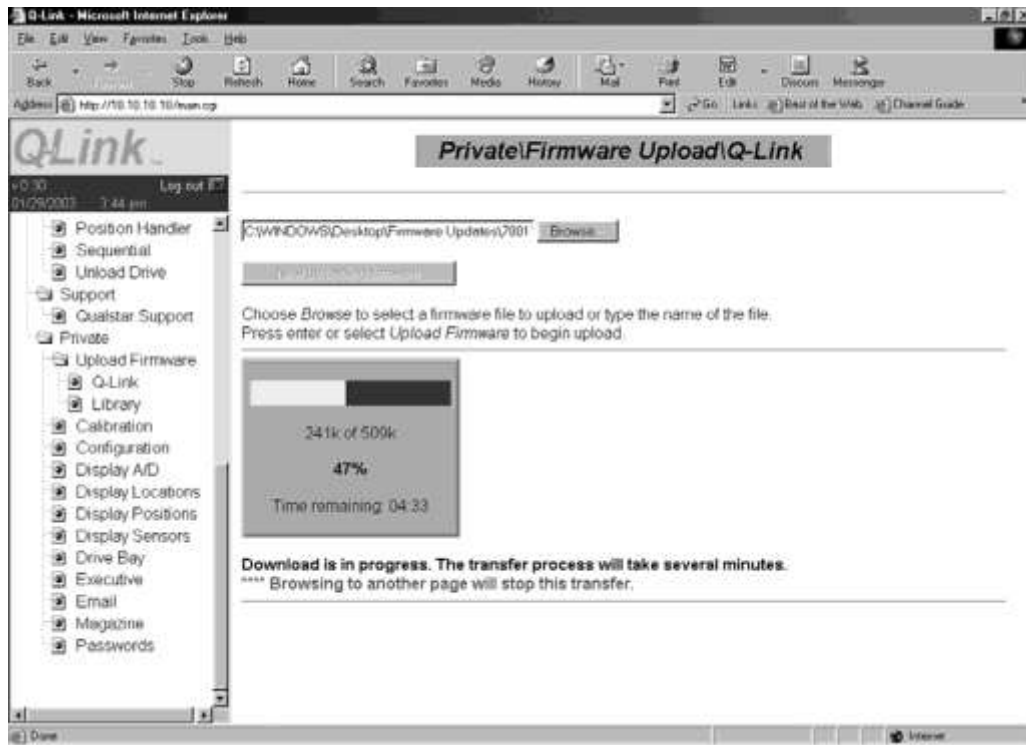
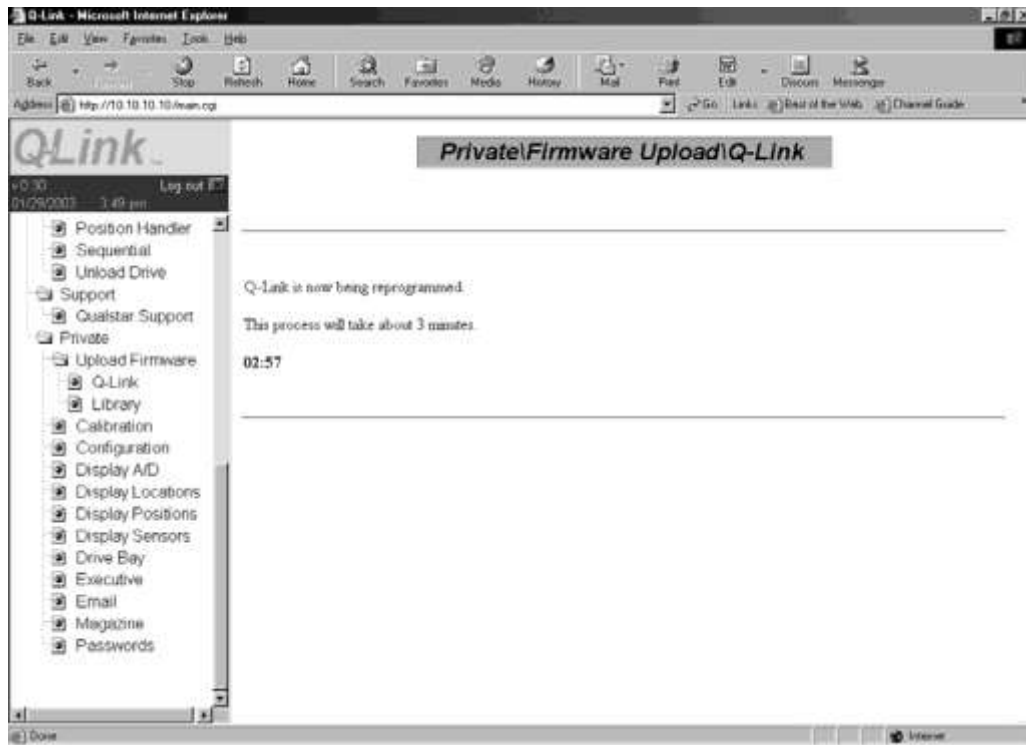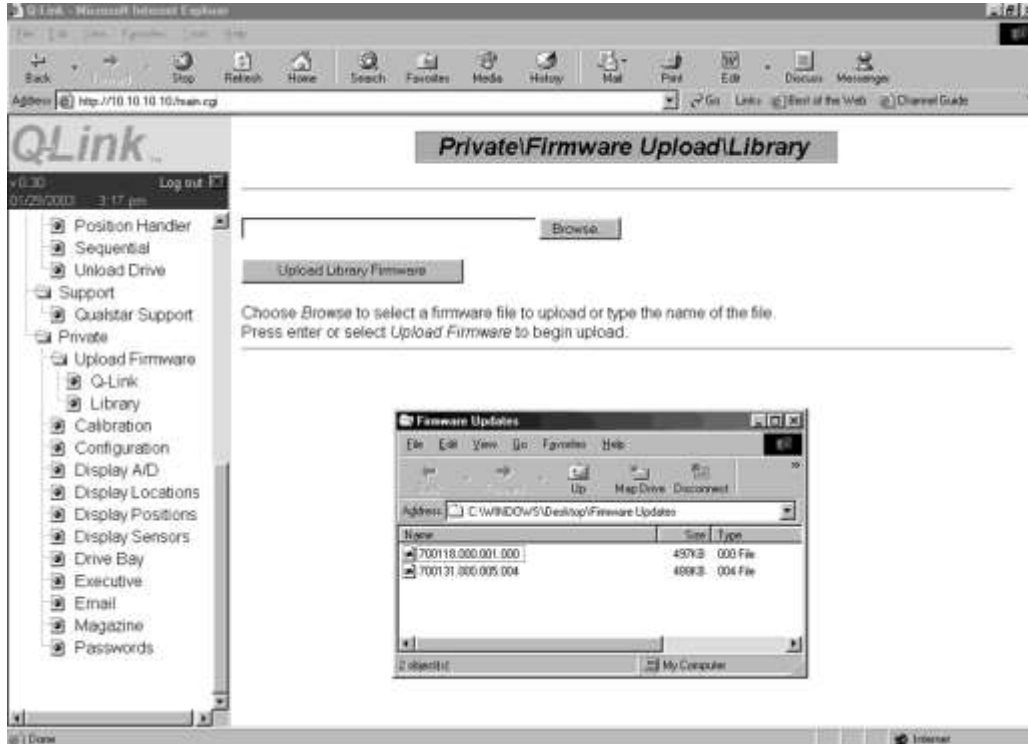**Figure 11-9   Sample of the Q-Link Firmware Upload Progress Screen**

Figure 11-10   Sample of the Q-Link Firmware Reprogramming Progress Screen

5. When the Q-Link uploading/programming is complete a screen will appear that shows the old and new firmware information. See Figure 11-11. Note that the current firmware version appears under the Q-Link graphic in the browser.

Q-Link uploading/programming has finished.

Old firmware information:
Date: 9/15/2002
Part number: 700118
Revision: 000.00024

New firmware information:
Date: 1/30/2004
Part number: 700118
Revision: 000.00039

Figure 11-11   Sample of the Q-Link Uploading/Programming Has Finished Screen

11.11.2 Library Firmware Uploading

Click on the Library menu item under the Upload Firmware folder in the menu tree to access the Private\Firmware Upload\Library screen and follow the instructions below.

1. Access the firmware file by either clicking on the Browse button or typing the file path to the firmware file.

Figure 11-12   Sample of the Library Firmware Upload Screen

2. Press the enter key or click on the Upload Firmware button to begin the uploading process.

3. **Note that after the upload begins browsing to another page will stop the firmware uploading process.**

4. Two different screens will appear as the uploading process proceeds. See Figure 11-13 and Figure 11-14.
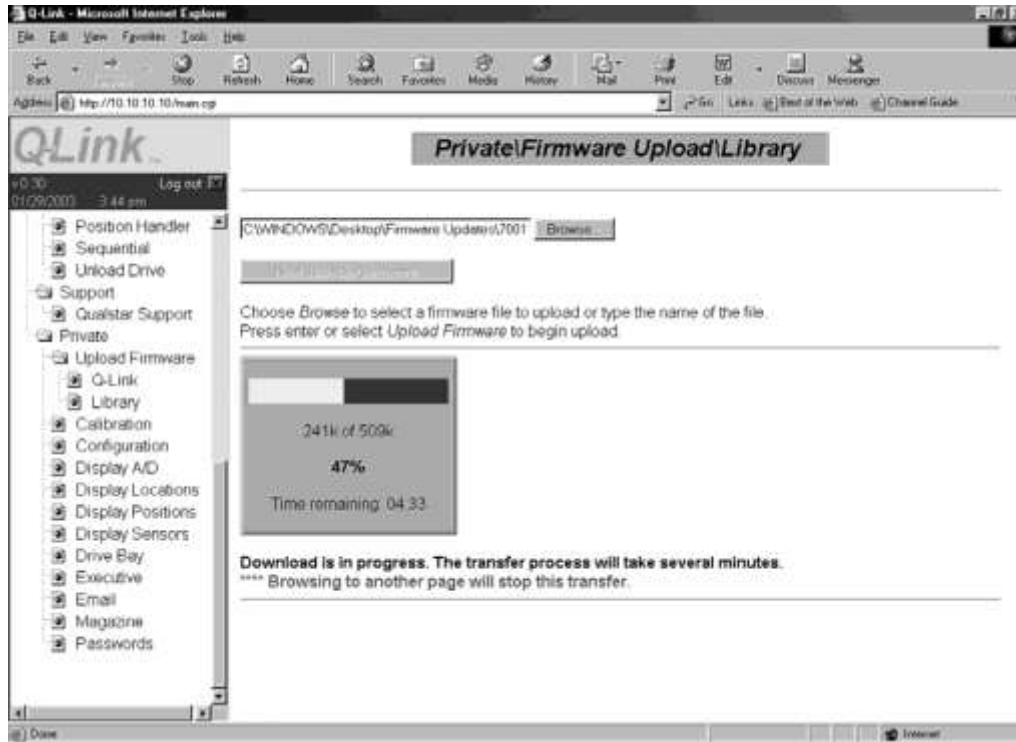

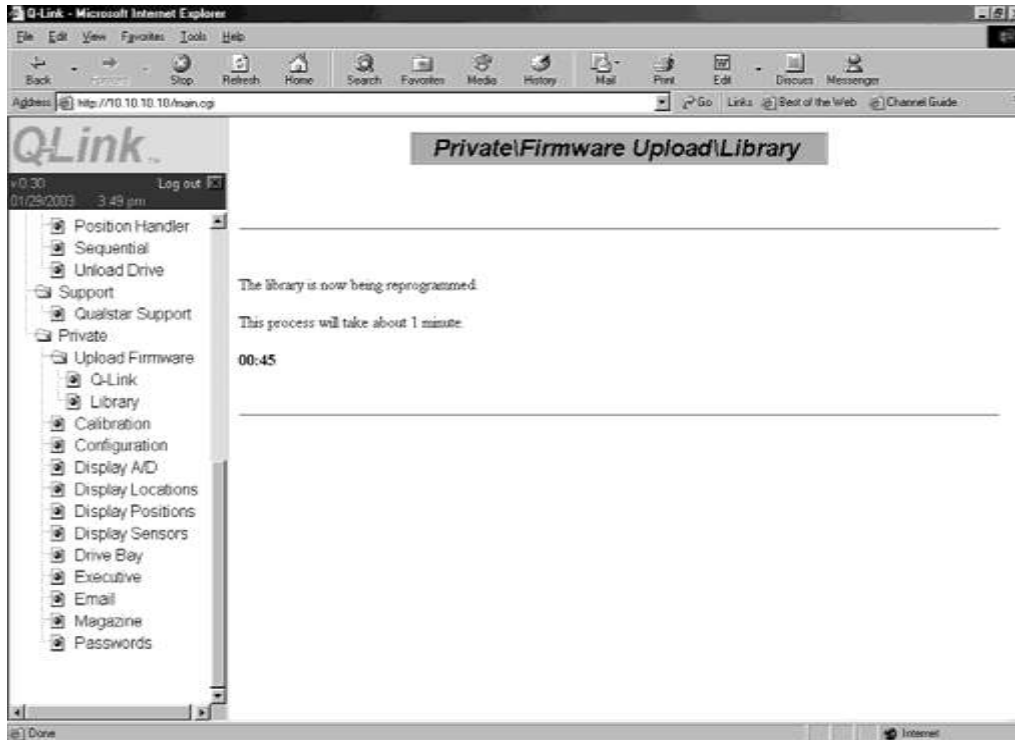**Figure 11-13   Sample of the Library Firmware Upload Progress Screen**

Figure 11-14   Sample of the Library Firmware Reprogramming Progress Screen

> **5.** When the Q-Link uploading\programming is complete a screen will appear that shows the old and new firmware information. See Figure 11-15.

Library uploading/programming has finished.

Old firmware information:
Date: 7/20/2004
Part number: 700118
Revision: 0.77

New firmware information:
Date: 9/20/2004
Part number: 700118
Revision: 0.83

Figure 11-15   Sample of the Library Uploading/Programming Has Finished Screen

12.   Fibre Channel Interface

The 2-GB Fibre Channel Interface Personality Module (IPM) provides two LVD/SE-160 SCSI ports and a single Fibre Channel port utilizing either single-mode or multi-mode 2-gigabit, plug-in SFP's to match SAN requirements. The Fibre Channel IPM may have shipped with the library or it can easily be installed by replacing the standard SCSI IPM. A single 18-inch VHDCI to HD68 SCSI cable is provided to connect the Medium-changer to certain HD68 based tape drives.

When LTO2 tape drives are installed one SCSI port should be used for each tape drive. For RLS-8204D, 8216CD, 8236CD, 8236D, 8244D, 8404D and 8444D models the optional Fibre Channel IPM provides communication and control with the Medium-changer while the tape drives are Direct Fibre Attach (DFA) and attach directly to a host or switch.
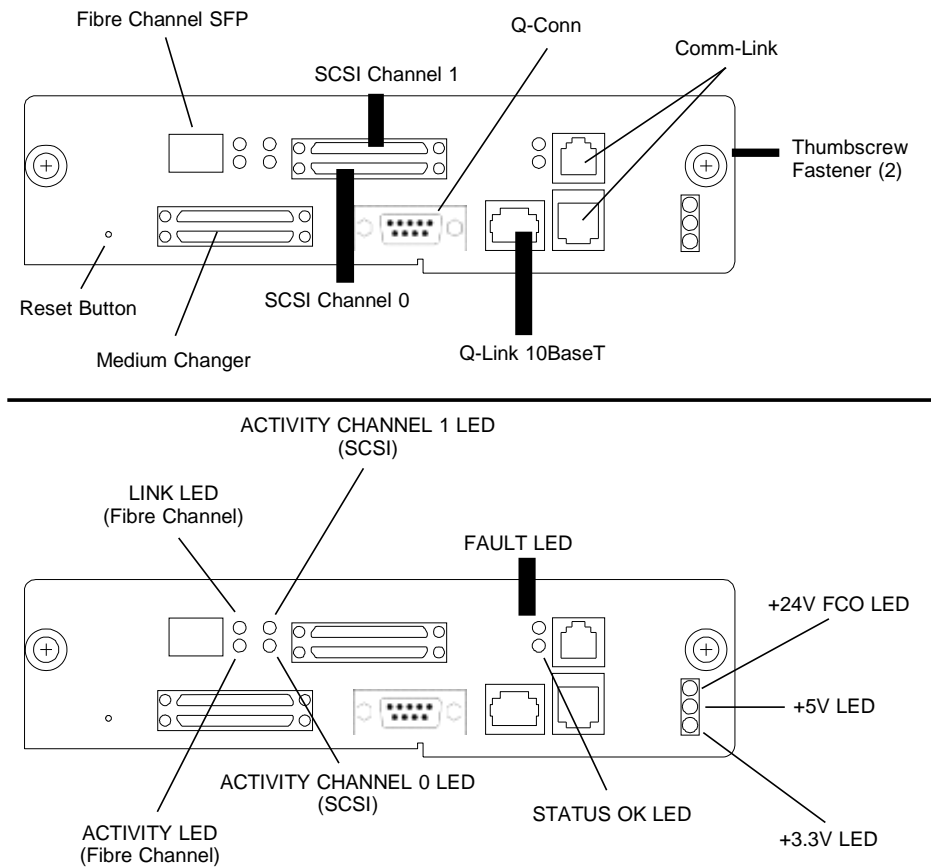

Figure 12-1   Rear View of the Fibre Channel IPM

12.1   Installing the Fibre Channel IPM

Thumbscrew Fasters (2)

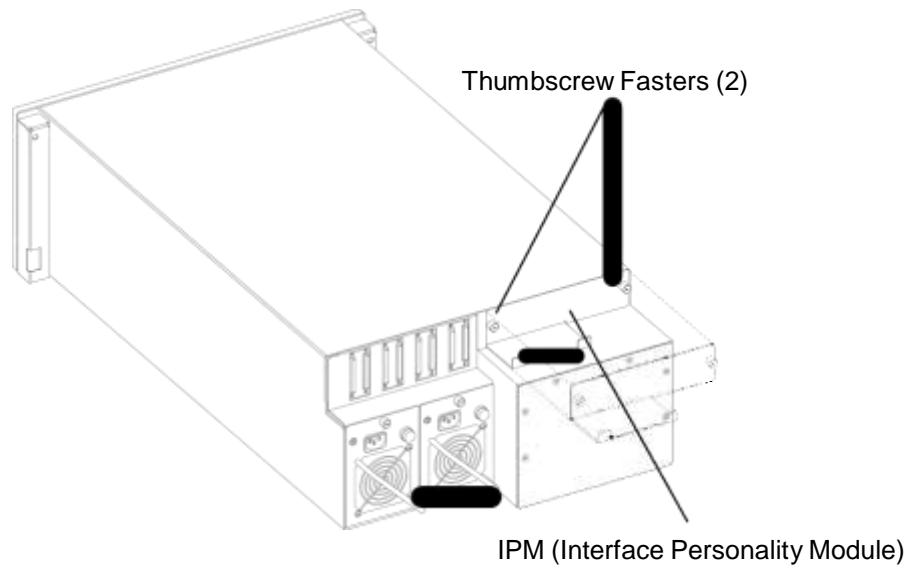IPM (Interface Personality Module)

Figure 12-2   IPM Location on the rear of the RLS

If the 2-GB Fibre Channel IPM is not currently in the RLS it can be installed by following the steps below:

1.   Remove the SCSI IPM currently in the RLS by loosing each of the thumbscrew fasteners. Using your thumb and index finger, rotate the fasteners counter-clockwise until they are unthreaded completely and rotate freely.

2.   Grasp both fasteners and gently pull the SCSI IPM backwards out of the library.

3.   Take the Fibre Channel IPM and carefully align it with the IPM opening in the rear of the library.

4.   Gently push the Fibre Channel IPM into the rear of the library until you feel it "snap" into place.

5.   Using your thumb and index finger, rotate the thumbscrew fasteners clockwise until they are both completely threaded.

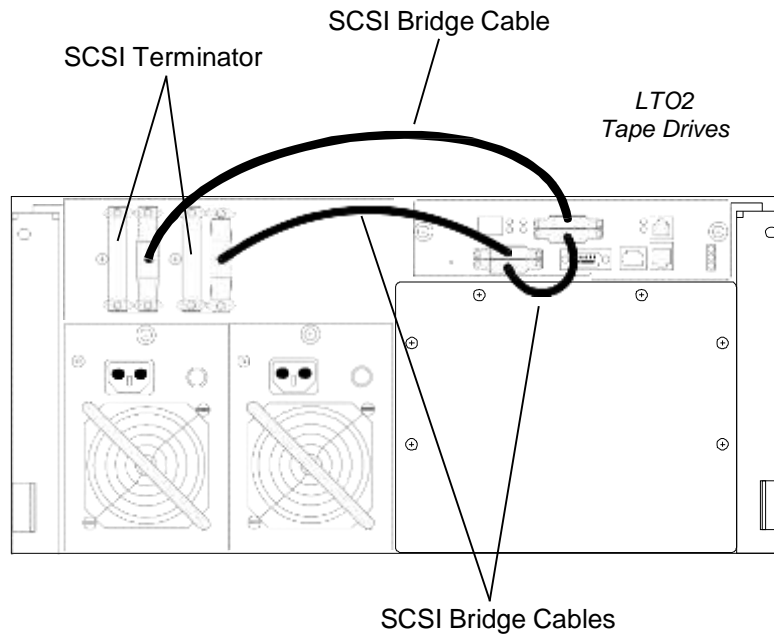## 12.2 Cabling and Connections for the Fibre Channel IPM

Figure 12-3 RLS-8236 Cabling Diagram with LTO2 Tape Drives. N/A for LTO3, LTO4 or LTO5

Fibre Channel Cables
to Switch or Host

SCSI Terminator

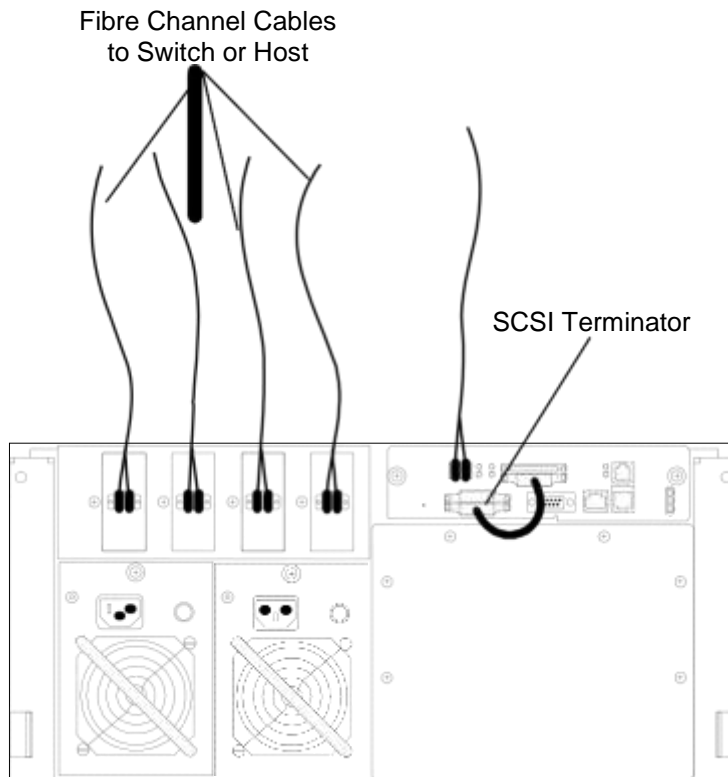Fibre Channel Cables
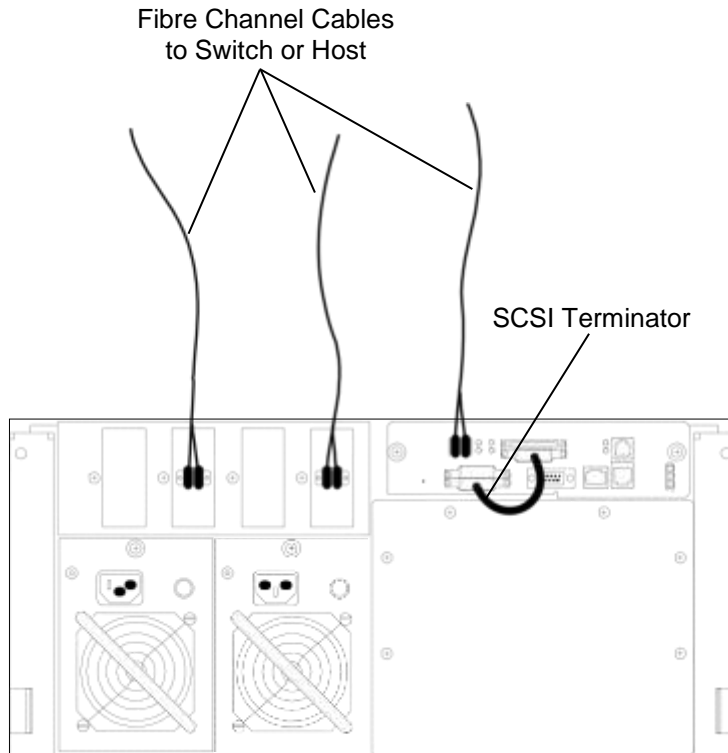to Switch or Host

SCSI Terminator

Figure 12-4   DFA Connection Examples for RLS-82xxD or 84xxD Models

Install the serial communication bridge cable. The serial communication bridge cable is a short telephone type cable with a six-conductor RJ11 plug on each end. Insert each ended of the serial communication bridge cable (P/N-510149-01-6) into the RJ11 jacks on the Fibre Channel IPM. See Figure 12-5.
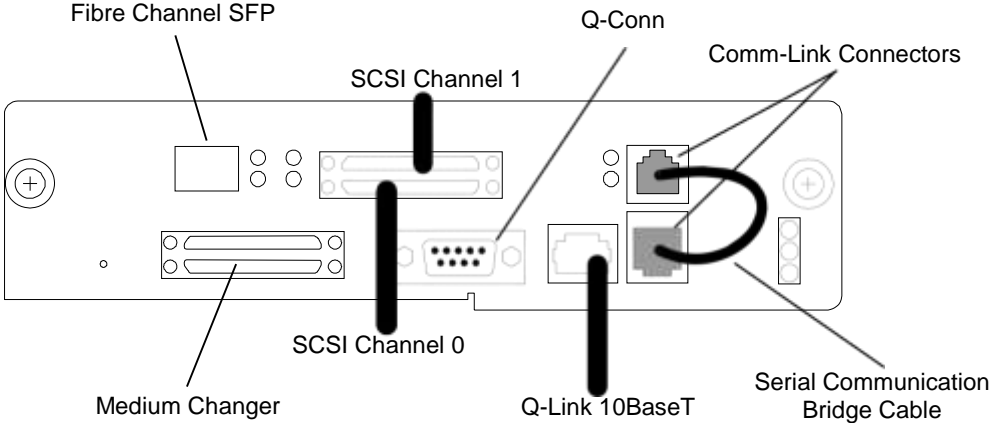

Figure 12-5 Install the Fibre Channel Serial Communications Bridge Cable

Prepare to insert the appropriate SFP (Small Form Factor Pluggable) transceiver into the Fibre Channel IPM. Note that the SFP adapter is keyed and the small circuit board connector is facing up when oriented correctly. See Figure 12-6. Locate the rectangular opening in the Fibre Channel IPM and insert the SFP transceiver connector end first. Then carefully guide the SFP transceiver into the IPM until it clicks into place. Refer to Figure 12-7.

Small circuit board is facing up
when oriented correctly for insertion.

Figure 12-6 Top View of Small Form Factor (SFP) Pluggable Transceiver
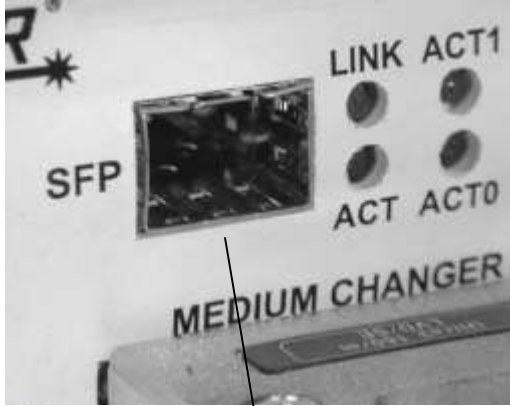
Rectangular opening in the rear of
the Fibre Channel Bridge IPM

SFP adapter fully inserted into the
Fibre Channel Bridge IPM

Figure 12-7 Inserting SFP Adapter into Fibre Channel IPM

12.3   Initializing the Fibre Channel IPM

After installing the Fibre Channel IPM into the library disconnect (if connected) the
Fibre Channel IPM from the FC host or FC Switch to avoid affecting any operational
systems.

Apply power to the RLS library. During initialization, the library will reposition the
cartridge handler and tape magazine carrousel. The tape drives and magazines will be
scanned to inventory the contents of the library. The third line of the LCD displays
the status of these operations.

If the Fibre Channel IPM is detected, it will also display status information on the
third line of the LCD. If there is more than one message to be displayed, they will
cycle at one-second intervals. Table 12-1 shows the possible messages that can appear
while the Fibre Channel IPM is initializing.

```
Qualstar•••••RLS-8000

FC: Please Wait
```

Status message	Status Condition
Please Wait	Waiting for Fibre Channel to complete restart initialization.
Reading Config	Reading the Fibre Channel configuration data.
Checking Config	Checking the Fibre Channel configuration.
Setting Config	Setting the Fibre Channel configuration.
Controller Reset	Resetting the Fibre Channel.

Table 12-1 Possible Fibre Channel Status Messages

If a serial communications error to the Fibre Channel Bridge is detected, the following warning will be displayed.

```
Fibre Channel
Communications
error detected
ENTER to continue
```

Pressing the ENTER key will clear the message.

This warning message can be caused by an incorrectly installed serial cable. If the message reoccurs after checking the cables and clearing the message using the ENTER key several times, it may require power cycling the library, to reset the Fibre Channel Bridge. If this problem occurs, please contact the Technical Support department at Qualstar so that corrective action can be taken.

The initialization procedure can take up to several minutes. If the host system is started while Fibre Channel Bridge status messages are still present, the host may miss seeing the Fibre Channel devices because the system is still busy. The host should be instructed to scan for Fibre Channel devices after the Fibre Channel Bridge has been configured and line three is clear in the RLS Library's LCD display.

12.4   Configuring the Fibre Channel Loop ID

The Id Mode must be configured for either "Soft" or "Fixed" addressing. Using "Soft" addressing, the Fibre Channel Bridge connects to an arbitrated loop using the first available AL_PA, scanning from the highest valid address to the lowest. Using "Fixed" addressing, the user selects a specific arbitrated loop address (AL_PA) to connect with. If the selected address is not available, the Fibre Channel Bridge will connect with the first available address it finds. The use of "Soft" or "Fixed" addressing is based on the user's installation requirements.

Soft addressing can be configured when address conflicts are not likely. If the Fibre Channel Bridge is connected directly to the computer's HBA (Host Bus Adapter), the selection of a specific Loop Id is not usually required. For example, Emulex HBA drivers scan for an available address starting from the low Fibre Channel address range. The Fibre Channel Bridge begins scanning for an available address starting from the high Fibre Channel address range. This avoids address conflicts and the Fibre Channel Loop Id will be assigned the same value each time it is restarted.

Hard addressing should be configured if address conflicts can occur. This can happen if the Fibre Channel Bridge is connected to a Fibre Channel Hub. Since many HBA drivers map the Fibre Channel Loop Id to a SCSI Bus/Target address, this mandates that the Fibre Channel Loop Id be very stable, and cannot be allowed to change if the system is simply restarted. This might happen if soft addressing were used and the Fibre Channel Bridge found its previous address taken. Selecting a fixed address is a way to prevent the Fibre Channel Loop Id from changing if the system is restarted.

If the computer's HBA uses the World Wide Port Name (WWPN) convention instead of the Loop Id to map to a SCSI Bus/Target/Lun address, the value of the Loop Id is no

longer important. The WWPN is always unique and consistent under all conditions. In the future, all addressing will likely use the WWPN.

```
C••••••Fibre•Channel
•Device
 Id Mode 0:      SOFT
 Loop Id 0:       nnn
 Topology 0:     LOOP
```

The `Configuration\Fibre Channel` menu panel displays the SCSI device interface and configures the Fibre Channel Interface to host. The menu sets the Fibre Channel Bridge host topology.

The "Topology" has two selections, LOOP and FABRIC. The LOOP selection configures the Fibre Channel Bridge for Arbitrated Loop (FC-AL) operation. The FABRIC selection configures the Fibre Channel Bridge for Switch Fabric (FC_SW) operation. If the mode is LOOP, the `Id Mode` and `Loop Id` entries are available.

The `Id Mode` menu item has two selections, `FIXED` or `SOFT`. If the mode is FIXED, the `Loop Id` entry is displayed. If the `Id Mode` is SOFT, the Loop ID is automatically assigned by the Fibre Channel Bridge.

During the Fibre Channel Arbitrated Loop (FC-AL) initialization process, a unique Arbitrated Loop Physical Address (AL_PA) value is assigned to each port on the loop. Not all of the 256 hex values are allowed as AL_PA values per FC-AL. The Loop Id value is used to represent the 126 addresses that the Fibre Channel Bridge can use. Table 8-5 shows how a Loop Id value maps to an AL_PA. If the Id Mode is "SOFT", the Fibre Channel Bridge will attempt to obtain an available Loop Id, in the following order: 0, 1, 2, etc.

12.5   Configuring the Fibre Channel SCSI Devices Interface

To establish the SCSI device configuration the Fibre Channel Bridge is commanded to "Rescan" its two SCSI device buses while the FCO will rescan its six buses. The SCSI device channels, starting with Channel 0, begin scanning for SCSI devices using ascending SCSI Target Ids. After all the channels have been scanned, the Fibre Channel Bridge builds a SCSI device table, that it uses to map SCSI Targets to the host as logical devices (LUNs).

```
C••••••Fibre•Channel
•Device
 Id Mode 0:      SOFT
 Loop Id 0:       nnn
 Topology 0:     LOOP
```

Press the V (UP) or W (DOWN) key to move the pointer to `Device`. Press the ENTER key to enter the `Configuration\Fibre Channel\Device` menu.

The Configuration\Fibre Channel\Device menu panels display a list of SCSI devices attached to the Fibre Channel Bridge.

```
CFC•••••••••••Device
 •0
 •1
 •2
 •3
 •4
 •5
 •6
 •7
 •8
 •9
 •10
 •11
 •12
 •13
 •14
 •15
```

The Fibre Channel Bridge assembles a list of SCSI devices it detects on its SCSI channels. This menu displays the SCSI devices that a Fibre Channel Bridge has detected. To initiate the scan operation, press the W (DOWN) key to move the pointer to RESCAN and press the ENTER key. The RESCAN item will disappear and return when the operation completes.

CAUTION

The RESCAN operation should be performed with the Library disconnected from the host. The Fibre Channel Bridge is restarted and SCSI device address maybe modified.

Press the EXIT key to return to the top LCD display and wait for the third line to clear of status messages.

13. Demonstration Procedure

The demonstrations procedure is primarily used in trade show exhibits to demonstrate the RLS and should NOT be run on a live system, where the RLS is connected to a functioning host computer.

13.1 Start Up

Plug in the power cord or two cords on dual-redundant power supply models and press the power switch in the lower right corner of the Front Panel/Door. The fans should start, the Power Indicator, Display and the RLS interior should illuminate followed by some carriage motion. The RLS will then perform its Power-On Self Test. When completed, the Display will indicate the RLS model number on the top line. When the initialization is complete, press the MENU key and the display should appear as below.

```
Top Menu
Î•Configuration
 •Maintenance
 •Operation
```

1. Press the W (DOWN) key to select `Operation`, then press the ENTER key.

```
••••••••••Operation
•Clean Drive
•Demonstrations
•Element Status
•Move Cartridge
•Position Handler
•Position Magazine
•Sequential
•Unload Drive
```

2. Press the W (DOWN) key to select `Demonstrations`, then press the ENTER key.

```
O•••••Demonstrations
 •Feature List
 START RANDOM MOVES
   Load Drives:  NO
```

13.2 Demonstrations Menu

The `RANDOM MOVES` function will randomly move cartridges about indefinitely. The `Feature List` is a marketing slide show presentation.

13.2.1 Feature List

When the `Feature List` item is selected, a slide show type of presentation begins. The slide show displays a continuous series of messages that highlight various RLS features. Each message is displayed for a few seconds, then a new message appears. The slide show continues until the `EXIT` or `MENU` key is pressed.

13.2.2 START RANDOM MOVES Command

The `START RANDOM MOVES` command starts a continuous sequence of random cartridge moves, providing a visual presentation for trade shows and other demonstrations. The changer continues randomly moving cartridges until the `STOP RANDOM MOVES` command is invoked.

The `START RANDOM MOVES` command disappears from the menu after it is invoked. It reappears in the menu after the `STOP RANDOM MOVES` command is invoked to stop the demonstration.

13.2.3 STOP RANDOM MOVES Command

The `STOP RANDOM MOVES` command stops the continuous sequence of random cartridge moves that begins when the `START RANDOM MOVES` command is invoked.

The `STOP RANDOM MOVES` command appears in the menu after the `START RANDOM MOVES` command is invoked. It disappears from the menu after it is invoked to stop the demonstration.

13.3 Shutdown

To stop the `Feature List` slide show presentation, press the `EXIT` or `MENU` key.

To stop the `Random Moves` demonstration, Press the W (DOWN) key to select `STOP RANDOM MOVES`, then press the ENTER key.

```
O•••••Demonstrations
 •Feature List
Î STOP RANDOM MOVES
   Load Drives:  NO
```

You may press the `MENU` and `EXIT` keys to return to the normal control panel display screen. After the components of the library stop moving, it is in its standby state. Power may be removed at this time.

14.   Preventive Maintenance

This chapter describes the things that can be done to keep the RLS running reliably.

DANGER

TO AVOID THE POSSIBILITY OF PERSONAL INJURY, BE SURE TO TURN OFF
THE RLS' POWER AND DISCONNECT THE POWER CORD BEFORE DOING ANY
WORK INSIDE THE CABINET.

GEFAHR

UM EVENTUELLE PERSÖNLICHE VERLETZUNGEN ZU VERMEIDEN, VERSICHERN
SIE SICH VOR JEGLICHER ARBEIT INNERHALB DES GEHÄUSES DAß DER STROM
DES RLS AUSGESCHALTET UND DAS STROMKABEL AUSGESTECKT IST.

14.1   Periodic Cleaning

After a library has completed 20,000 cartridge exchanges, the following message will
appear in the display:

```
••••••••••••••••••
Time for Periodic
    Maintenance.
     See Manual
```

This message can be suppressed for up to one minute by pressing the `MENU` or `EXIT`
key. It is recommended that the preventative maintenance instructions in this
chapter be followed at this time. After preventative maintenance has been completed
press the `ENTER` key to reset the counter and clear the display.

14.1.1   Cleaning the Exterior

Use any standard office equipment cleaner and a soft, clean cloth to clean the exterior
of the RLS. Do not use ammonia-based cleaners, or other harsh cleaning solutions, as
these may damage the unit's paint. The window is made of polycarbonate plastic and
should be cleaned with an appropriate, ammonia-free, plastic-cleaning solution.
Kleenmaster Brillianize is recommended.

NOTE

Kleenmaster® Brillianize® is produced by Chemical Products Co., Inc., Omaha, Nebraska.

14.1.2   Cleaning the Interior

The inside of the RLS cabinet is pressurized to keep out dust and cooled by filtered air to ensure an optimum operating environment. If a build-up of dust inside the unit should be noticed, check the condition of the air filter element and replace it if it is dirty. Instructions for checking and changing the air filter are given in Section 14.2 and Section 14.3.

Plastic dust from the cartridges may eventually accumulate on the gripper assembly and the bottom of the cabinet. This should be removed with a vacuum cleaner or slightly damp cloth.

14.1.3   Cleaning the Tape Drives

The cleaning procedure can be automated by storing a cleaning cartridge in one of the tape cartridge locations, and then using a host system's maintenance program to automatically load the cleaning cartridge into each tape drive. Refer to Chapter 9 of this manual for details about the RLS' `Operation\Clean Drive` menu.

Use a cleaning tape to clean an HP LTO drive when the Use Cleaning Cartridge LED lights on the drive's front panel (Figure 14-1).
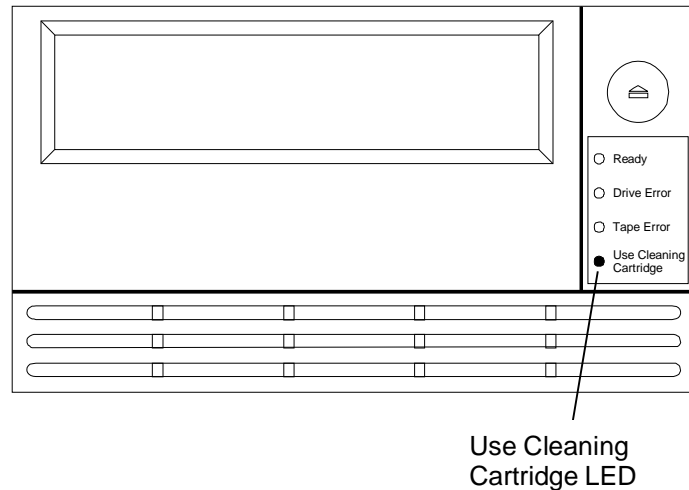

Figure 14-1   HP LTO Tape Drive – Front View

Use a cleaning tape to clean an IBM LTO3 or LTO4 drive when C displays on the drive's single-character display (Figure 14-2).

Status Light
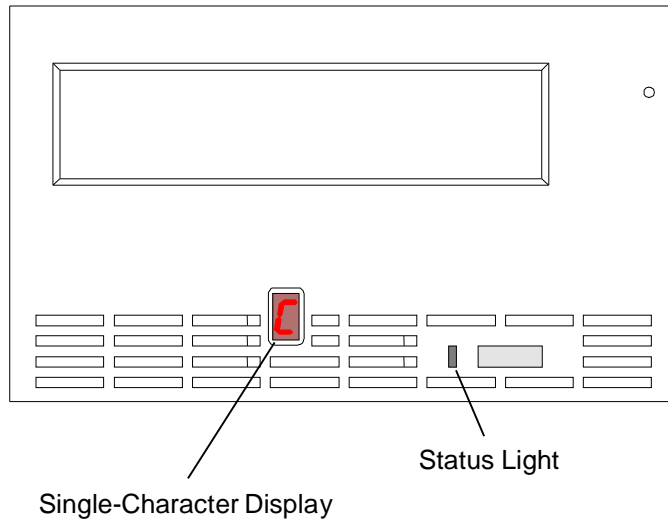
Single-Character Display

Figure 14-2   IBM LTO3, LTO4 or LTO5 Tape Drive – Front View

Use a cleaning tape to clean an IBM LTO3 HH drive whenever the Clean LED is lit on the drive's front panel (Figure 14-3)
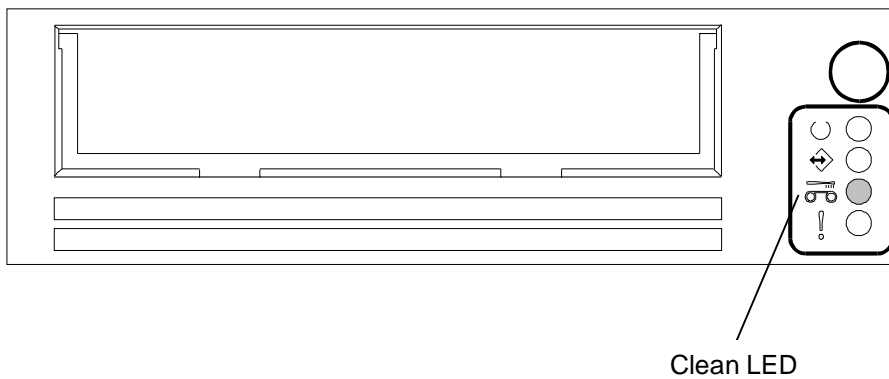

Clean LED

Figure 14-3   IBM LTO3 HH Tape Drive – Front View

Use a cleaning tape to clean an IBM LTO4 HH drive when C displays on the drive's single-character display and the status light flashes amber at one second intervals (Figure 14-3).
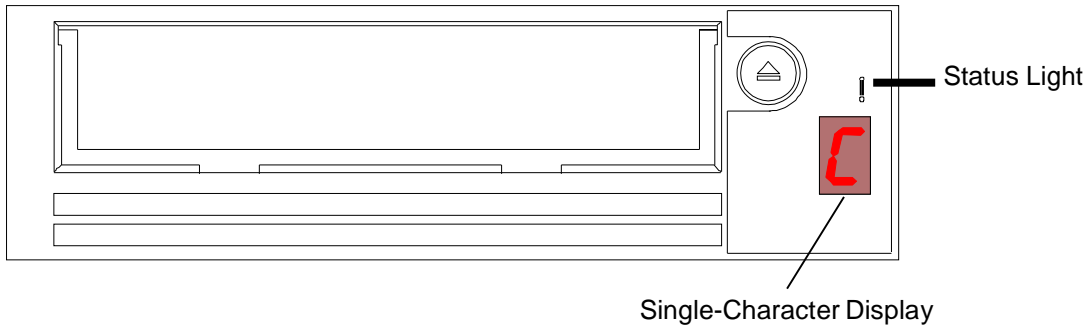

Status Light

Single-Character Display

Figure 14-4   IBM LTO4 or LTO5 HH Tape Drive – Front View

14.2   Checking the Air Filter

The RLS and the tape drives are cooled by outside air that is drawn into the RLS enclosure through an air filter. This filter keeps dust and dirt from entering the enclosure, as its presence could degrade the reliability of the tape drives and media. If the filter becomes clogged with dust and dirt, the amount of airflow will be diminished. Diminished airflow could cause the tape drives to run hotter, again degrading their reliability. Therefore, it is important to periodically check the air filter and replace it when it becomes dirty.

The time between filter changes is very dependent upon the local environment. Inspect the filter frequently when the RLS is first installed. Then, when the effects of the local environment become known, adjust the inspection schedule accordingly.
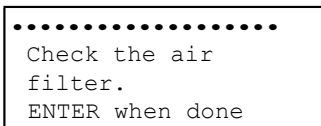
```
••••••••••••••••••
Check the air
filter.
ENTER when done
```

Figure 14-5   Air Filter Alert

The RLS automatically keeps track of its power-on time. The Filter Days value in the Configuration\Advanced\Changer menu determines how often the user will be reminded to check the air filter. New units are set to 120 days. An alert will be displayed when the operating time exceeds the Filter Days value provided the menu system is not active. When the Check the air filter alert displays (Figure 14-5 above), follow the steps below:

NOTE

> *New air filters are black. A color change indicates the presence of some dirt, which is acceptable. However, if dirt is clinging to the outside filter surface, it is time to replace the filter.*

1. Visually inspect the air filter element at the bottom of the front panel/door (Figure 14-6).

2. When the air filter alert appears, if the filter does not need replacing, press the EXIT key. This will dismiss the alert, but will not reset the Filter Days timer.

3. Next, increase the `Filter Days` value in the `Configuration\Advanced\Changer` menu. If it is estimated that the filter could go an additional 90 days, increase the `Filter Days` value accordingly.

   Example: Change the value from `120` to `210` days.
   Since pressing the EXIT key to dismiss the air filter alert message does not reset the power-on-days timer, the timer continues counting from its present value and the next alert will occur in 90 power-on days.

   When the next air filter alert occurs, if the filter needs replacing, leave the `Filter Days` value at 210 days. If the filter still does not need replacing, press the EXIT key, then increase the `Filter Days` value again. Keep increasing the `Filter Days` value each time the air filter alert appears until the maximum value for the given environment is determined.

4. If the filter does need replacing when the air filter alert message appears, press the ENTER key to dismiss the alert and reset the Filter Days timer. Then, follow the procedure in Section 14.3 to replace the air filter.
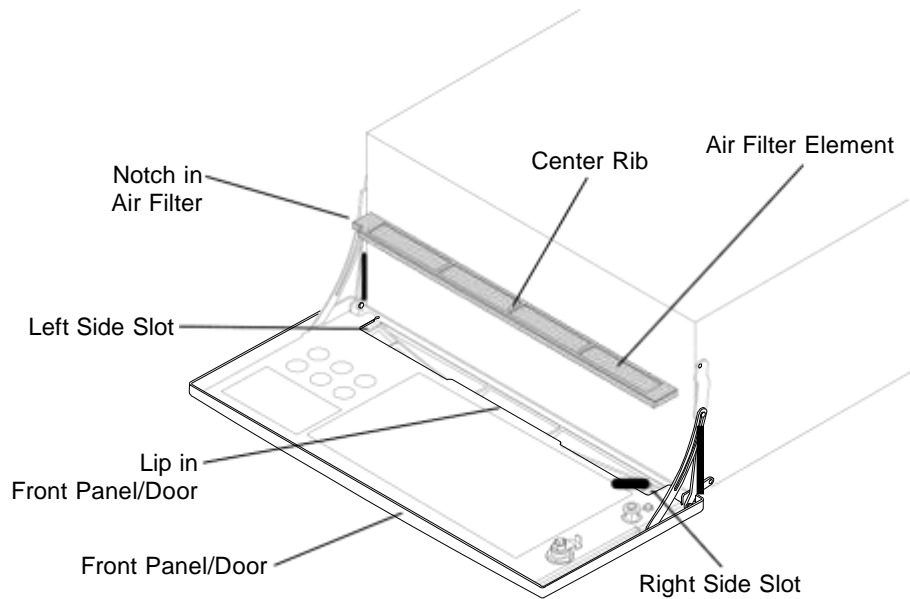
14.3 Replacing the Air Filter

Figure 14-6   Air Filter with the Front Panel/Door Open

1.   Open the front panel/door as described in Section 5.3.

2.   Grasp the center rib of the air filter element and pull it up and slightly rearward to clear the lip built into the front panel/door.

3.   Pull the right side of the filter towards the center of the front panel/door to clear the right side slot.

4.   Pull the left side of the filter towards the center of the front panel/door clear the left side slot.

5.   Take a new air filter element and turn it so that the ribs are facing up and the end with the notch is pointing towards the left side of the RLS.

6.   Fully insert the right side of the filter into the right side slot.

7.   Fully insert the left side of the filter into the left side slot.

8.   Tuck the center portion of the filter under the lip built into the front panel/door.

9.   Push down and flatten any portion of the filter may be above the edge of the front panel/door.

10.   Close the front panel/door.

14.4 Magazines

Be sure to inspect each magazine at least once per year. Replace a magazine if it has any broken parts. Clean with a slightly damp cloth if dusty.

14.5 Cartridges

Cartridges should be replaced when their door mechanism breaks. This requires transferring the data to another cartridge and applying a new (and probable different) barcode label to the cartridge. Caution must be exercised to prevent a loss of data. Clean with a dry, lint free cloth if dust has accumulated in the recesses of the gripping area or on the rear sides of the cartridges.

15. Repacking

This chapter explains how to properly repack the RLS for shipping.

DANGER

DEPENDING UPON THE MODEL, THE RLS WEIGHS OVER 150 POUNDS (68Kg), EXCLUDING MAGAZINES AND CARTRIDGE DRIVES. IMPROPER LIFTING TECHNIQUES CAN RESULT IN BACK INJURY AND/OR EQUIPMENT DAMAGE. GET HELP WHEN LIFTING OR MOVING THE RLS.

GEFAHR

ABHAENGIG VOM MODELL BETRAEGT DAS GEWICHT DER RLS OHNE MAGAZIN UND CASSETTENLAUFWERK ÜBER 68kg (150 POUND). FALSCHES TRAGEN KANN ZU PERSONENVERLETZUNGEN UND/ODER ZU BESCHAEDIGUNGEN DES GERAETES FUEHREN. TRAGEN ODER BEWEGEN SIE DAS GERAET NIE OHNE MINDESTENS EINE ZWEITE HILFSPERSON.

The following items were packed in the original shipping carton:

*   RLS Tape Library

*   One Power Cord

*   Two Door Keys

*   The printed Installation and Operation Manual (this document)

*   A full complement of empty magazines with dust covers

*   Round SCSI bridge Cable (connects Medium-changer to tape drive)

*   HD68 SCSI Terminator

15.1   Repacking the RLS

The RLS was originally shipped in a specially designed carton with four energy-absorbing end caps. When shipping the RLS, use the original shipping container and packing materials. If the original shipping container and packing materials are not available, order a new shipping container by calling Qualstar Technical Support.

CAUTION

Remove magazines and cartridges before proceeding. To prevent damage, do not ship the RLS with magazines or cartridges installed.

15.2   Preparation for Packing

Prepare the unit for packing as follows:

1.   Remove all tape cartridges, cleaning cartridges and magazines.

2.   Remove the power cord and place it in the accessory carton.

15.3   Packing the RLS

With the help of an assistant, follow the instructions below.

Refer to Figure 15-1 and Figure 15-2.

1.   Place the RLS on a flat working surface (item 1).

2.   Pull the plastic bag over the RLS (item 2).

3.   Place the foam block at the rear of the RLS on all models except the RLS-8204, RLS-8204D, RLS-8244, RLS-8244D, RLS-8444 and RLS-8444D (item 2).

4.   Place the four inserts on each corner of the RLS (item 3).

5.   Lift the RLS with its inserts attached and place it into the shipping carton (item 4).

6.   Place the accessory pack and rack slide pack into the shipping carton (item 5).

7.   Fold the flaps of the shipping carton down.

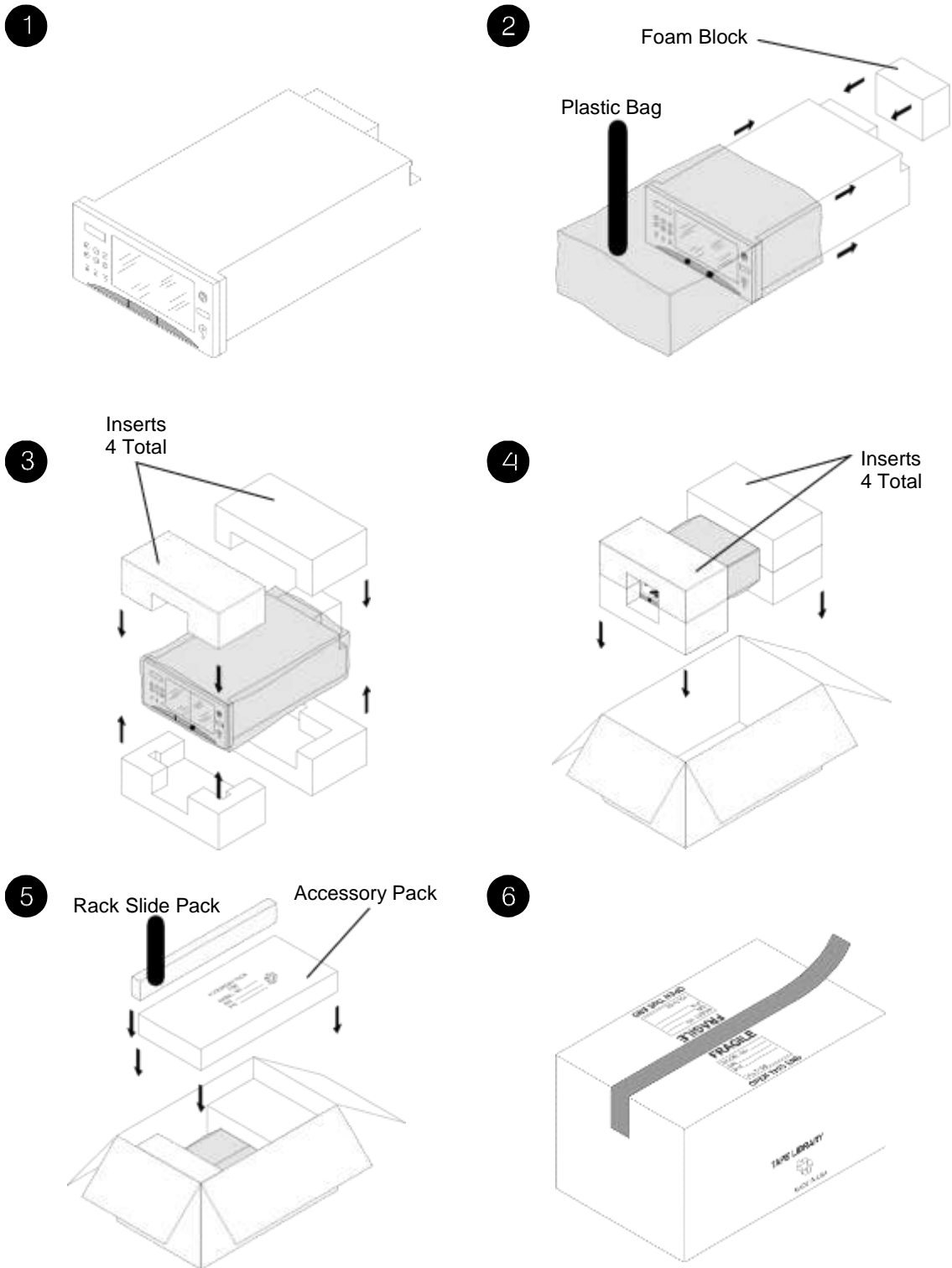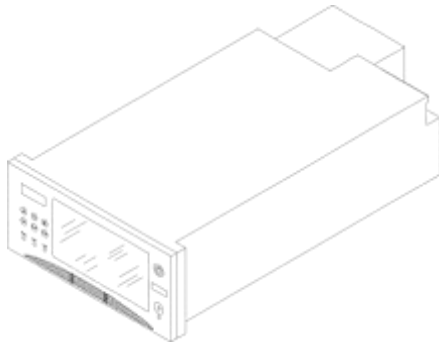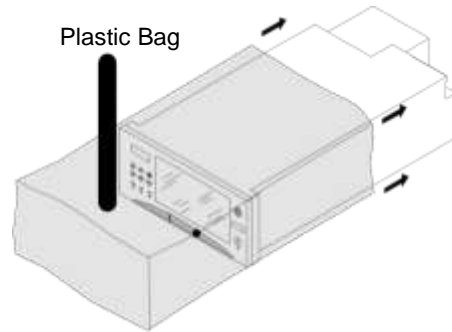8.   Seal the shipping carton with shipping tape (item 6).

Figure 15-1   Repacking the RLS - All models except the RLS-8204, 8204D, 8244, 8244D & 8444H

1

2

Plastic Bag

3

Inserts
4 Total

4

Inserts
4 Total

5

Rack Slide Pack

Accessory Pack
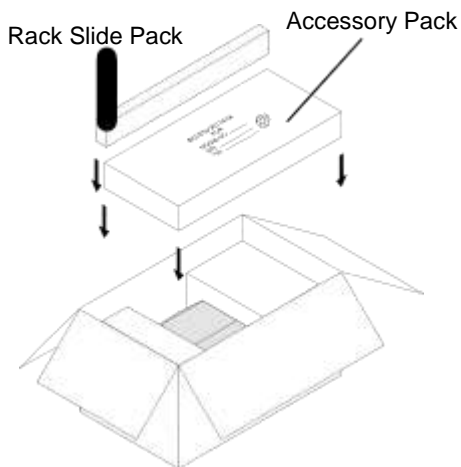
6

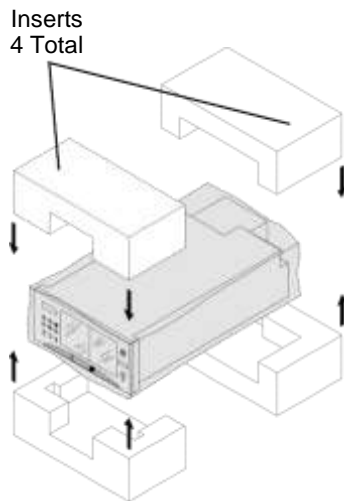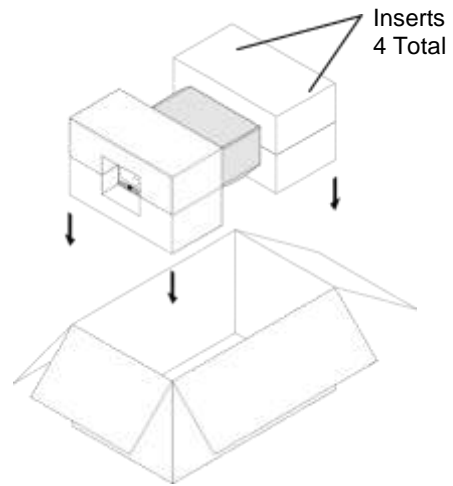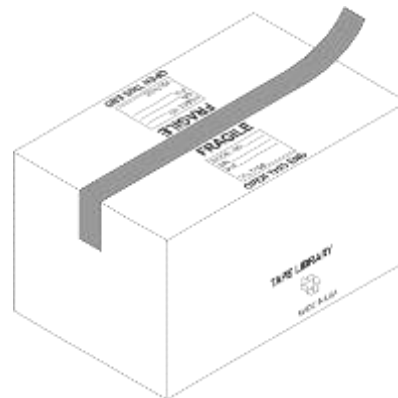**Figure 15-2   Repacking the RLS-8204, 8204D, 8244, 8244D & 8444H**

```
                          ┌───────────┐
                          │    RLS    │
                          └───────────┘
                                │
     ───────────────── SCSI  Bus ──────────────┬──────────────┐
     │                                         │              │
┌─────────┐                              ┌──────────┐   ┌───────────┐
│ CHANGER │                              │   TAPE   │   │   TAPE    │
└─────────┘                              │  DRIVES  │   │ CARTRIDGE │
     │                                   └──────────┘   └───────────┘
  ┌──┴──────────┬──────────────┐
┌─────────┐ ┌──────┐ ┌──────────┐
│ CONTROL │ │ VIOP │ │ CARRIAGE │
│  PANEL  │ └──────┘ └──────────┘
└─────────┘             │
                  ┌─────┴────────┐                ┌──────────────┴────────┐
              ┌─────────┐ ┌──────────┐       ┌───────────┐          ┌──────────┐
              │ HANDLER │ │ BARCODE  │       │ MAGAZINES │          │  FIXED   │
              └─────────┘ │ READER   │       └───────────┘          │  SLOTS   │
                          │(optional)│             │                └──────────┘
                          └──────────┘      ┌──────┴──────┐
                                      ┌──────────┐  ┌──────────┐
                                      │ CAROUSEL │  │ STORAGE  │
                                      └──────────┘  │  ARRAY   │
                                       (rotates)    └──────────┘
```
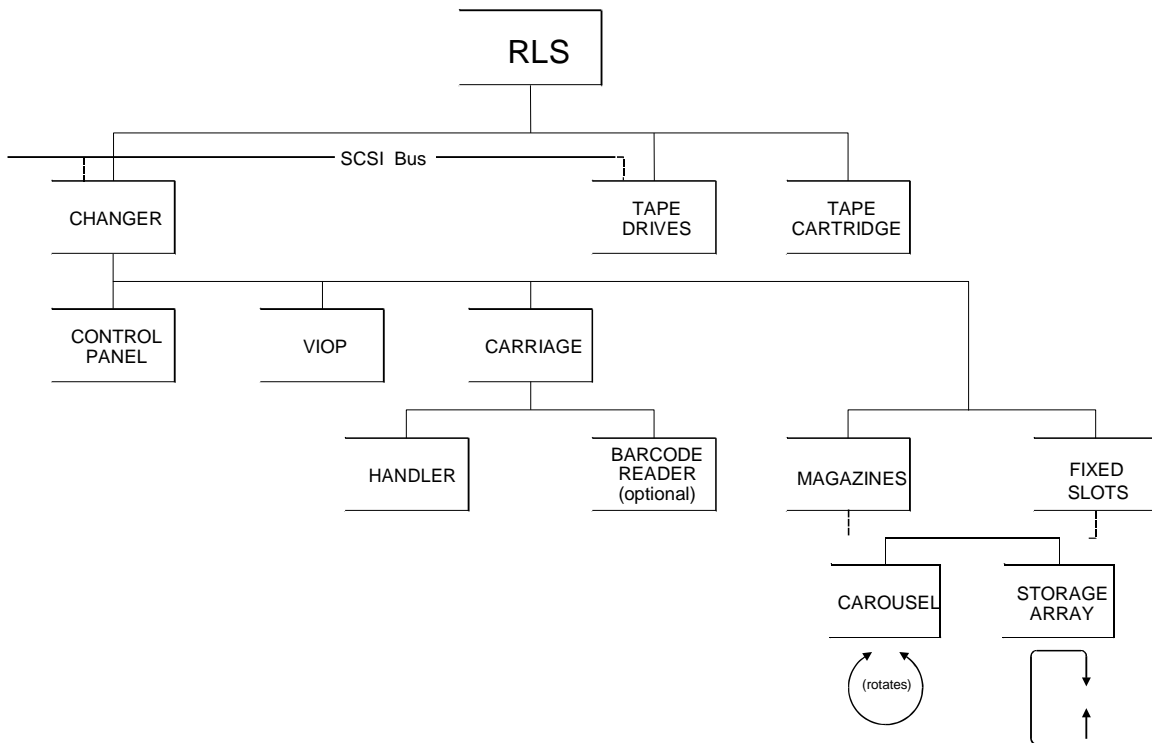
Figure 16-1   Diagram of Glossary Terms

**Barcode
Reader**   This device (optional on some models) reads barcode labels found on Tape Cartridges. Barcode label information may be used to identify each Tape Cartridge in the RLS.

Browser   An application program that runs on a computer and is used to browse the contents of web sites and pages on the Internet or LAN.

BDIA   Buffered Drive Interface Adapter provides for truly hot-swappable tape drives by actively isolating the external SCSI bus of each tape drive from its internal SCSI bus.

Carousel   A Carousel is the mechanism that rotates the Magazines into position opposite the Carriage and the Handler. Only some models are equipped with carousels. Some models are equipped with two carousels.

Carriage   A Carriage is the mechanism that travels horizontally within the RLS in order to move Tape Cartridges. It contains the Handler and the optional Barcode Reader.

Changer   The Changer is the central control system of the RLS. The Changer is the device that moves tapes to and from all locations. It is controlled by the SCSI host computer and/or the operator via the Control Panel. The Changer includes everything except the Tape Drives and Tape Cartridges.

COD	Capacity on Demand – This feature is found on the RLS-8204 and allows the user to upgrade the cartridge capacity of the library in the field by entering a unique command and adding magazines.
Control Panel	The Control Panel has a group of control keys and an alphanumeric display. The Control Panel is used to inform the operator of the Changer's status and to accept setup, operational and diagnostic commands from the operator.
Cookies	A very small data file deposited on a computer by a web-based site for future recovery of the client's identification and preferences.
DHCP	Dynamic Host Configuration Protocol – A system for dynamically allocating IP addresses.
DIA	Drive Interface Adapter is a circuit board between the internal drive bay and the rear panel pair of SCSI connectors. There are two types available: Passive and MSE160. See Quick-Swappable and Hot-Swappable for further details.
DIFF	See HVD
Dual-Redundant	A system of two redundant power supply modules that supply DC power to the RLS. The failure of either redundant module, will cause an alarm condition, but the RLS will continue to function normally. The failed module may be replaced while the RLS continues operating on the good module.
Ethernet	The standard describing the physical characteristics and protocol used on most local area computer networks or LANs.
Fixed Slots	Fixed Slots are storage locations that are not removable from the RLS. These slots are frequently used to store cleaning cartridges and are also referred to as Storage Elements in the SCSI specification. Fixed slots are only found in the RLS-4221 model.
Handler	The Handler is a mechanism on the Carriage that holds a Tape Cartridge with its Gripper mechanism. The Handler travels horizontally to insert and remove Tape Cartridges from the Tape Drives and storage locations. A Handler is referred to as the Medium Transport Element in the SCSI specification.
HD68	The industry standard High Density, 68-pin SCSI connector system.
Hot-Swappable	The optional MSE160 Drive Interface Adapter (MSE160 DIA) introduces a FAST-160 SCSI expander (repeater) chip between the Tape Drive and the pair of SCSI connectors on the rear panel. A tape drive may be removed from or inserted into the RLS while it is powered (hot) and while other tape drives are operating. The connection between the pair of SCSI connectors for this drive will NOT be broken when the drive is removed and all other SCSI devices on this drive's SCSI bus should continue to function while the drive is removed from the RLS. If enabled, SCSI termination power for this pair of connectors also remains active while the tape drive is removed. Most systems should survive the removal of a tape drive with this option.
http:	Hypertext Transfer Protocol

HVD	High Voltage Differential type of SCSI interface not supported in the RLS family.
IP	Internet Protocol – The data transport protocol used by the Internet.
IPM	The Interface Personality Module (IPM) always provides a SCSI interface to the RLS Medium-changer. It can optionally provide the Q-Link, LAN/Web based remote manager interface. A 2-Gigabit Fibre Channel to SCSI IPM with Q-Link is also available for connecting the RLS and all of its tape drives to a Storage Area Network (SAN).
Java Script	Java script used in web pages that is interpreted by the user's browser.
Java Virtual Machine	A program that interprets Java script.
Location Designator	A Location Designator contains alphanumeric characters used to describe any *physical* tape storage location within the RLS.
LAN	Local Area Network – A physical interconnection medium allowing computers to communicate with each other.
LTO©	Linear Tape Open – an industry standard ½-inch tape format also know as Ultrium. Copyrighted by HP, IBM and Seagate
LVD	The Low Voltage Differential SCSI interface is standard on the RLS and tape drives.
LVD/SE	See MSE
Magazine	A Magazine is a molded container that holds three to five Tape Cartridges. A Magazine can be removed from a RLS without removing the Tape Cartridges in the Magazine. The locations within Magazines are referred to as Storage Elements in the SCSI specification.
Medium-changer	The official SCSI name for the portion of a tape library that actually moves tape cartridges (data medium). See Changer.
MSE	Multimode Single-Ended SCSI interface that works with either Low-Voltage Differential (LVD) or Single-ended (SE) SCSI buses.
PCBA	Printed Circuit Board Assembly
Q-Link	Qualstar's proprietary Remote Library Manager that provides a web site in the library.
Quick-Swappable	The standard Passive Drive Interface Adapter (Passive DIA) provides a direct loop-through connection between the Tape Drive and the pair of SCSI connectors on the rear panel. A tape drive may be removed from or inserted into the RLS while it is powered (hot) and while other tape drives are operating, however, the connection between the pair of SCSI connectors for this drive will be broken as long as the drive is unplugged. SCSI termination power from the tape drive carrier will also be lost while the drive is removed. Thus, unplugging a tape drive on a live system could cause the SCSI bus to hang and bring down the system. This scheme is referred to as Quick-

Swappable and is capable of running at FAST-160 SCSI speeds.

Robotics Any part of the library that moves. This includes the Carousel, Carriage, Gripper, Handler, Storage Array, VIOP, etc.

SAN Storage Area Network – usually provided by a Fibre Channel backbone.

SE Single-ended type of SCSI interface.

SFP Small Form-factor Plugable optical interface module. This module plugs into the optional Fibre Channel Bridge to provide the 2-gigabit optical connection to a SAN.

SMTP Simple Mail Transfer Protocol – The standard e-mail protocol on the Internet.

Stacker A term that refers to a "Single-pass, sequential-only Changer." A Stacker device changes Tape Cartridges for a single Tape Drive from a stack of available Tapes Cartridges. The sequence cannot be repeated without operator intervention. A Stacker needs no commands from a host computer to perform its function. All that is required of the host computer is for it to write its data to tape and then eject the tape when it becomes full.

Subset Mask The mask used on a LAN to determine if a packet is destined for another site on the LAN or outbound for the Internet.

Tape Cartridges Tape Cartridges are magnetic tape media used to store data. Tape Cartridges, including data and cleaning cartridges, may be placed in any of the physical locations.

Tape Drives Tape Drives are devices used to write and read data to and from Tape Cartridges. They are mounted a Drive Carrier which plugs into the RLS drive bay. The Changer and Tape Drives may reside on the same SCSI bus, but they never communicate with each other over that bus. The Tape Drives are referred to as Sequential-access devices in the SCSI specification.

VHDCI The latest generation of SCSI connectors known as Very High Density Cable Interconnect.

VIOP The Variable I/O Port (VIOP) feature allows the user to define from one to a magazine full of tape cartridges to be imported to or exported from the RLS. The SCSI host can lock the VIOP to prevent unauthorized inventory access. The VIOP is referred to as the Import/Export Element in the SCSI specification.